ADS V4
User's Manual
Part II
Airplane Dataset

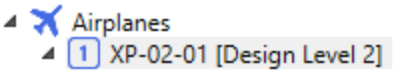
May 2, 2024

Table of content

1. Introduction

1.1. The root node Airplanes

The airplane dataset is created from the root node **Airplanes**



Contextual Menu :	
Right click :	
New Airplane	To create a new Airplane dataset in the current session
Open Airplane	To load an Airplane dataset in the current session
Duplicate Airplane	To duplicate an Airplane dataset and load it in the current session

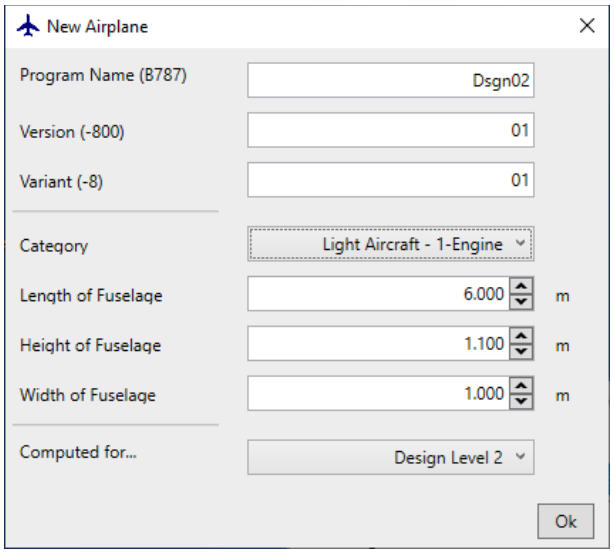
Several airplane datasets may be loaded in the same session

1 ...	The airplane datasets that will be loaded in the current session
2 ...	
3 ...	
4 ...	

1.2. To Create a new airplane dataset in the current session

To create an airplane dataset in the current session, from the root node **Airplanes**:

Contextual Menu :	
Right click :	
New Airplane	To create a new Airplane dataset in the current session



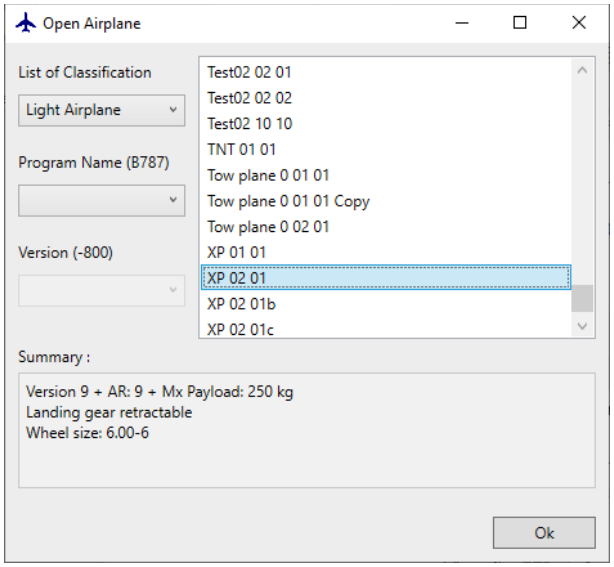
1. Enter
    a) The name of the Airplane Program (Dsgn02)
    b) The name of the Airplane Version (01)
    c) The name of the Airplane Variant (01)
    d) The Airplane Category
    e) The total length of the Fuselage
    f) The maximum Height of the Fuselage
    g) The maximum Width of the Fuselage
    h) Computed for…
2. Click on OK

The New Airplane dataset is generated and then displayed in the TreeView

1.3. To Load an Airplane dataset in the current session

To load an airplane dataset in the current session, from the root node **Airplanes**:

Contextual Menu :	
Right click :	
Open Airplane	To load an Airplane dataset in the current session



1. Select
   a) Type (Light Airplane)
   b) Program (Dsgn02)
   c) Version (01)

   to filter the list.

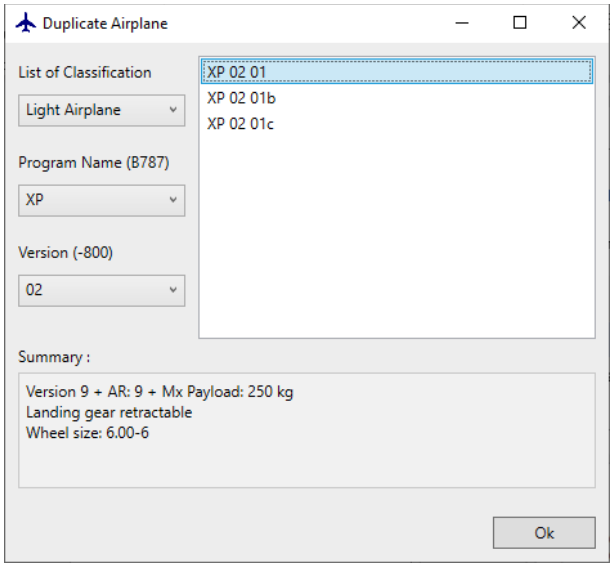
   When available, a brief description of the selected dataset is displayed in the Summary Area
2. Double click on the name of the airplane dataset **or** click on the name then click on **OK**

The selected Airplane dataset is loaded and then displayed in the TreeView

1.4. To duplicate an Airplane dataset and load it in the current session

To duplicate an airplane dataset in the current session, from the root node **Airplanes**:

Contextual Menu :	
Right click :	
Duplicate Airplane	To duplicate an Airplane dataset and load it in the current session



1. Select
   a) Type (Light Transport)
   b) Program (Dsgn01)
   c) Version (01)

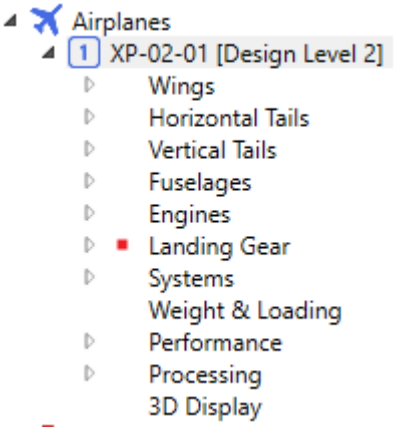
   to filter the list

   When available, a brief description of the selected dataset is displayed in the Summary Area
2. Double click on the name of the airplane dataset **or** click on the name then click on **OK**

One copy of the selected Airplane dataset is displayed in the TreeView

2. Description

The structure of the airplane dataset is well defined. The data are put together according to the subitem to which they belong.



Subitems:	
Wings	Data relative to the Wings
Horizontal Tails	Data relative to the Horizontal Tails
Vertical Tails	Data relative to the Vertical Tails
Fuselages	Data relative to the Fuselages
Engines	Data relative to the Engines
Landing Gear	Data relative to the Landing Gear
Systems	Data relative to the Systems
Weight & Loading	Data relative to the Weight & Loading
Performance	Data relative to Performance
Cost	Data relative to the costs
Processing	Data relative to Processing and Options
3D Display	Data relative to the 3D Display

IMPORTANT TO READ: all branches of the Tree View, all contextual menus, all properties may not be visible simultaneously. It depends among other on airplane's classification (UAV, light aircraft, Airliner…) and the computing options (Design, Performance Analysis…).

2.1. XP-02-01 (Design Level 2)

Root branch of the current dataset. The header is the concatenation of the Program Name, the Version and the Variant. Under brackets the current processing.

Properties :		
General	Model	XP-02-01
	Program	Program Name (XP)
	Version	Version (-02)
	Variant	Variant (-01)
	Category	List of Categories: - Landplane - Landplane (STOL) - Landplane (VTOL) - Flyingboat
	Classification	List of Classification: - Unmanned Aircraft - Light Aircraft - Light Transport - Light Business
Accommodation	Occupants	Maximum Number of Occupants
Airframe	Is Composite	Specifies if it is built with Composite
	Is Light Alloy	Specifies if it is built with Light Alloy
	Is Tube	Specifies if it is built with Tube
	Is Wood	Specifies if it is built with Wood
Airworthiness Requirement	Regulation	List of Regulations from Regulation database
Configuration	Has Canard Surface	Specifies if it has a Canard Surface
	Has Floats	Specifies if it has Floats
	Has Horizontal Tail	Specifies if it has a Horizontal Tail
	Has Landing Gear	Specifies if it has a Landing Gear
	Has Vertical Tail	Specifies if it has a Vertical Tail
	Has V-Tail	Specifies if it has a V-Tail
Engine	Type	List of engine type: - Piston - Turboprop - Electric

Contextual Menu :		
Right click :		
Duplicate		To duplicate the current dataset
Remove		To remove the current dataset from the current session
Save		To save the current dataset
Save As		To save the current dataset and change its name
Export	STL	To Export the Geometry in the .stl file format
	BDF	To Export the Geometry in the .bdf file format
Refresh		To refresh the 3D-Model of the current dataset
Open Memo	List of Versions	To open a text file to write any comment about the different versions
	List of Variants	To open a text file to write any comment about the different variants
		To open a technical note

2.2. Wings

Data relative to all wings

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
	Standard Geometry	List of standard geometry definition - Trapezoidal - ESDU - Tip Based Cf.TN02-051 – Standard Geometry
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Fudge Factor	Ka	Fudge Factor used to tune the Weighted Average Airfoil Technology Factor (Ka) The Airfoil Technology Factor is used to compute the transonic drag (Korn equation). It should have a value of 0.87 for a NACA 6-series airfoil section, and a value of 0.95 for a supercritical section.
	Weight	Fudge Factor used to tune the weight prediction

2.2.1. #1

Data relative to one wing

Subitems:	
Sections	Characteristics of the wing sections
Structure	Characteristics of the Structural parts
Control Surfaces	Characteristics of the Control Devices
High Lift Devices	Characteristics of the High Lift Devices
Airbrakes	Characteristics of the Airbrakes
Winglet	Characteristics of the Winglet
Tanks	Characteristics of the Fuel Tanks
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (IC)	To display or hide all Internal Components (IC)
	Is Foldable	Specifies that the wing is foldable
Design Features	Has Battery Pack	Specifies if it has Battery Pack
	Has Fairing	Specifies if it has fairing at the junction of the fuselage (not visible on the 3D-Model). Will have an effect on the amount of interference drag
	Has Struts	Specifies if it has Struts
	Has Tank	Specifies if it has Tank
	Has Winglet	Specifies if it has Winglets
Flying Controls	Has Aileron	Specifies if it has Aileron
	Has Airbrake	Specifies if it has Airbrakes
	Has Flaps	Specifies if it has Flaps
	Has Slats	Specifies if it has Slats
	Has Spoiler	Specifies if it has Spoiler
Dimensions	Aspect Ratio	Aspect ratio
	Taper Ratio	Taper ratio
Folding System	Hinge Line	Hinge line location of the folding system
Geometry	Dihedral	Dihedral
	Incidence	Angle of incidence, angle between the datum line of the airplane from nose to tail, and the chord line of the airfoil section measured at root position
	Sweep @ LE	Sweep measured at leading edge position
	Twist	Twist, variation of local chord's incidence from root to tip. Negative if the incidence at tip position is lower than the incidence at root position. This is also called wash-out.
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Weight/CG	CG (X)	Center of gravity location (% MAC)
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To compute the geometry and refresh the 3D-Model
Compute Area	To compute the area
Compute Geometry	To compute the geometry
Display Internal Components	To display all internal components
Hide Internal Components	To hide all internal components
	To open a technical note

(1) Use the scroll wheel to increment the furthest right digit
Use the scroll wheel + Crtl button to increment the second furthest right digit
Use the scroll wheel + Shift button to increment the third furthest right digit
Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.2.1.1. *Sections*

Data relative to all wing sections

Properties :		
Design Features	Has Fairing	Specifies if it has fairings between trapezoidal sections

2.2.1.1.1. **#1 - n**

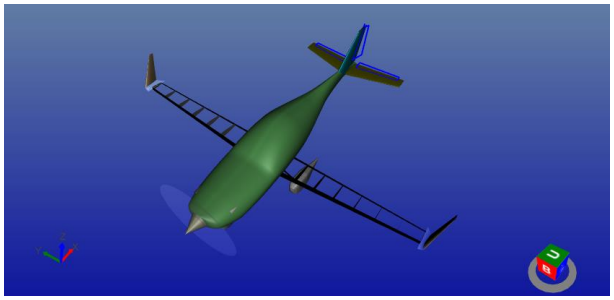
Data relative to one wing section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
	[Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections]
	[Exposed Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections. The area inside the nacelles has been subtracted from the total area]
Geometry	Fairing Radius	Radius of the junction between 2 trapezoidal sections
	Number of CS (Mx)	Maximum number of Cross Sections to define the fairing
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Contextual Menu :		
Right click :		
Insert New Cross Section		To insert a new Cross Section (before the selected one) Not possible if Computed for Design Level 1 & 2
Remove Cross Section		To remove the Selected Cross Section Not possible if Computed for Design Level 1 & 2
Compute Critical Mach Number (M_{crit})		To list in the output window the critical Mach number for different lift coefficient

Compute Airfoil Technology Factor (Ka)	To list in the output window the airfoil technology factor for different lift coefficient
List Airfoil Geometric Characteristics	To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics	To list the aerodynamic characteristics of the airfoil
Edit Shape	To edit the shape
	To open a technical note

2.2.1.2. *Structure*

Data relative to the structural parts of the lifting surface



Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Spars	Characteristics of the spars
Ribs	Characteristics of the ribs

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Ribs	Specifies if it is built with Ribs
	Has Spars	Specify if it is built with Spars
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.2.1.2.1. Skins

Data relative to all skins of the lifting surface. The skin is defined @ the location of every section of the lifting surface. Only if Computed for Structural Analysis

Properties :		
General	Has Identical Material	Specifies if the Skins are made with identical material
	Has Identical Thickness	Specifies if the Skins are of identical thickness

2.2.1.2.1.1. #1 – n

Data relative to one skin of the lifting surface

Properties :		
General	Material	To specify the Material of the Skin located between the current section and the next one (outboard)
	Thickness (Inboard)	Thickness of the skin on the inboard side of the current section
	Thickness (Outboard)	Thickness of the skin on the outboard side of the current section
Interpolation	Mean Thickness Location	Position along the span, between the current section and the next one (outboard), where the local thickness is equal to the mean thickness. Mean Thickness = 0.5 * (# i $_{Thickness}$ + # i+1 $_{Thickness}$) If equal to 50%, means linear interpolation

2.2.1.2.2. Ribs

Data relative to all ribs of the lifting surface

Properties :		
General	Display All	To display or hide all ribs
	Number of Ribs (Default)	Default number of ribs along the span
Have Identical	3D-Display	Specifies if the Ribs are of identical 3D-Display
	Has Identical Material	Specifies if the Ribs are made with identical material
	Has Identical Thickness	Specifies if the Ribs are of identical thickness
	LE/TE Positions	Specifies if the Ribs have identical Start/End positions
	Number of points	Specifies if the Ribs are of identical definition
Contextual Menu :		
Right click :		
Compute Default Position		To compute the default position of ribs along the span. The number of ribs is defined by Number of Ribs (Default). Equal spacing between Ribs.

2.2.1.2.2.1. #1 - n

Data relative to one rib of the lifting surface

Properties :		
General	Is Visible	To display or hide the current Rib
	Material	To specify the Material of the current Rib
	Orientation	To specify the orientation of the rib: - Parallel to the airplane longitudinal axis - Perpendicular to the front spar - Perpendicular to the rear spar - Parallel to stream direction - Free direction
	Thickness	Thickness of the Rib
Edge (LE)	Chordwise	Distance from the leading edge of the lifting surface to the Leading Edge of the Rib
	Front Spar	Specifies that the rib starts at the Front-Spar position
Edge (TE)	Chordwise	Distance from the leading edge of the lifting surface to the Trailing Edge of the Rib
	Rear Spar	Specifies that the rib ends at the Rear-Spar position
Orientation	Stream Angle	Stream Angle (only if Free Direction selected)
Position (RI)	Spanwise	Position of the Rib along the span
V3D - Geometry	Number of Points	Specifies the number of points to define the shape

Contextual Menu :	
Right click :	
Remove	To remove the selected Rib
Insert New Rib	To insert a new Rib (before the selected one)

2.2.1.2.2.1.1. *3D Display*

Definition of the representation of the rib on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.2.1.2.3. Spars

Data relative to all spars of the lifting surface

Properties :		
General	Display All	To display or hide all spars
	Has Identical Material	Specifies if the spars are made with identical material
	Has Identical Thickness	Specifies if the spars are of identical thickness
Configuration	Has Spar Box	Specifies if it has a spar box (connection between right and left spars)
Contextual Menu :		
Right click :		
Add New Spar		To add a new spar
Sort Spars		To sort the spars according to their position along the chord

2.2.1.2.3.1. #1 - n

Data relative to one spar of the lifting surface

Properties :		
General	Description	Name of the current Spar (LE, TE, …)
	Is Visible	To display or hide the current Spar
	Material	To specify the Material of the current Spar
	Thickness	Thickness of the Spar
Contextual Menu :		
Right click :		
Remove		To remove the selected spar

2.2.1.2.3.1.1. *#1 - n*

Data relative to one position of the spar at every lifting surface planform break position

Properties :		
Position	Chordwise	Position along the chord @ every lifting surface planform break position (% of lifting surface chord)
	Spanwise	Position along the span @ every lifting surface planform break position (computed value)

2.2.1.2.3.1.2. *3D Display*

Definition of the representation of the spar on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.2.1.3. *Control Surfaces*

Data relative to all control surfaces of the wing

Subparts	
Ailerons	Characteristics of the Ailerons
Spoilers	Characteristics of the Spoilers

Properties :		
Processing	Mass Equation	List of weight method prediction

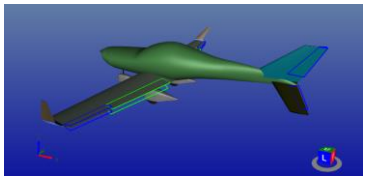
2.2.1.3.1. Ailerons

Data relative to all ailerons of the wing

Properties :		
General	Has Identical Material	Specifies if the Ailerons are made with identical material
	Has Identical Thickness	Specifies if the Ailerons are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Aileron		To add a new Aileron
Sort Ailerons		To sort the Ailerons according to their lateral position

2.2.1.3.1.1. **#1 – n**

Data relative to one aileron of the wing.
Represented by the blue lines on the 3D-Model



Properties :		
General	Is Visible	To display or hide the geometry
	Material	To specify the Material of the current Aileron
	Thickness	Thickness of the skin of the current Aileron
Type	Type	List of types: - Plain Flap - Split Flap - Single Slotted Flap - Double Slotted Flap - Fowler Flap
Deflection	Maximum (-)	Maximum Negative Deflection (°)
	Maximum (+)	Maximum Positive Deflection (°)
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of wing chord)
	Relative chord (o)	Chord @ outboard position (% of wing chord)
Hinge	Axis location	Hinge position (% of aileron chord)
Position	Inboard	Position along the span @ inboard position (% of wing span)
	Outboard	Position along the span @ outboard position (% of wing span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Aileron

2.2.1.3.2. Spoilers

Data relative to all spoilers of the wing

Properties		
General	Has Identical Material	Specifies if the Spoilers are made with identical material
	Has Identical Thickness	Specifies if the Spoilers are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Spoiler		To add a new Spoiler
Sort Spoilers		To sort the Spoilers according to their lateral position

2.2.1.3.2.1. #1 – n

Data relative to one spoiler of the wing

Properties		
General	Is Visible	To display or hide the geometry
	Material	To specify the Material of the current Spoiler
	Thickness	Thickness of the skin of the current Spoiler
Type	Efficiency	Fudge Factor used to tune the aerodynamic prediction
	Type	List of available type
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of wing chord)
	Relative chord (o)	Chord @ outboard position (% of wing chord)
	Relative span	Span (% of wing span)
Position (i)	Chordwise	Position along the chord @ inboard position (% of wing chord)
	Spanwise	Position along the span @ inboard position (% of wing span)

Position (o)	Chordwise	Position along the chord @ outboard position (% of wing chord)
	Spanwise	Position along the span @ outboard position (% of wing span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Spoiler

2.2.1.4. *High Lift Devices*

Data relative to all High Lift Devices of the wing

Subparts	
Flaps	Characteristics of the Flaps
Slats	Characteristics of the Slats
Settings	Characteristics of the Flap/Slat Settings

Properties :		
Processing	Mass Equation	List of weight method prediction

2.2.1.4.1. Flaps

Data relative to all flaps of the wing

Properties :		
General	Has Identical Material	Specifies if the Flaps are made with identical material
	Has Identical Thickness	Specifies if the Flaps are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Flap		To add a new Flap
Sort Flaps		To sort the Flap according to their lateral position
Compute Maximum Lift Increment		To compute the maximum lift increment

2.2.1.4.1.1. **#1 – n**

Data relative to one flap of the wing.

Represented by the green lines on the 3D-Model

Properties :		
General	Is Visible	To display or hide the geometry
	Material	To specify the Material of the current Flap
	Thickness	Thickness of the skin of the current Flap
Type	Efficiency	Fudge Factor used to tune the aerodynamic prediction
	Type	List of types: - Plain Flap - Split Flap - Single Slotted Flap - Double Slotted Flap - Fowler Flap
Deflection	Maximum (+)	Maximum positive deflection
Dimensions	[Area]	Total area of the flaps (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of wing chord)
	Relative chord (o)	Chord @ outboard position (% of wing chord)
Hinge Line	Hinge Axis Location	Hinge Axis Location (% of flap chord)
Position	Inboard	Position along the span @ inboard position (% of wing span)
	Outboard	Position along the span @ outboard position (% of wing span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Flap
Compute Maximum Lift Increment		To compute the maximum lift increment according to the geometry of the flap
		To open a technical note

2.2.1.4.2. Slats

Data relative to all slats of the wing (**specific to Airliners**)

Properties :		
General	Has Identical Material	Specifies if the Slats are made with identical material
	Has Identical Thickness	Specifies if the Slats are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Leading Edge Flap		To add a new Slat

2.2.1.4.2.1. #1 – n

Data relative to one slat of the wing

Properties :		
General	Is Visible	To display or hide the geometry
	Material	To specify the Material of the current Slat
	Thickness	Thickness of the skin of the current Slat
Type	Efficiency	Fudge Factor used to tune the aerodynamic prediction
	Type	List of types
Dimensions	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of wing chord)
	Relative chord (o)	Chord @ outboard position (% of wing chord)
Hinge Line	Hinge Axis location	Hinge position (% of slat chord)
Position	Inboard	Position along the span @ inboard position (% of wing span)
	Outboard	Position along the span @ outboard position (% of wing span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Slat

2.2.1.4.3. Settings

Data relative to all settings of the High Lift Devices

Contextual Menu :	
Right click :	
Add New Setting	To add a new Setting
Sort Settings	To sort the setting by increasing order of deflection

2.2.1.4.3.1. #1 - n

Data relative to one setting of the High Lift Device

Properties :		
General	Description	Name of the specific Setting (Phase of flight,…)
Deflection	Slat Deflection	Deflection of the slats
	Flap Deflection	List of flaps deflections, from inboard to outboard position, separated by /. The number of values must correspond to the total number of flaps. For STOL airplane with distributed propulsion, the ailerons must be added to the list. E.g. 80 / 70 / 40 / 40
	Maximum speed	Maximum flight speed @ this specific slats/flaps deflection
Contextual Menu :		
Right click :		
Remove		To remove the selected Setting

2.2.1.5. *Struts*

Data relative to all Struts of the wing

Properties :		
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Contextual Menu :		
Right click :		
Add New Strut		To add a new Strut
Refresh		To compute the geometry and refresh the 3D-Model

2.2.1.5.1. **#1 – n**

Data relative to one strut

Subitems:	
Sections	Characteristics of the sections of the strut
3D Display	Definition of the representation of the element on the 3D View

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis

2.2.1.5.1.1. Sections

Data relative to all sections of the strut

2.2.1.5.1.1.1. *#1 – 2*

Data relative to one section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (RI)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
List Airfoil Geometric Characteristics		To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics		To list the aerodynamic characteristics of the airfoil
Edit Shape		To edit the shape
		To open a technical note

2.2.1.5.1.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.2.1.6. *Winglet*

Data relative to the winglets of the wing

Subitems:	
Sections	Characteristics of the winglet sections
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Processing	Mass Equation	List of weight method prediction
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Geometry	Dihedral	Dihedral
	Radius (Fairing)	Radius of the junction between Wing and Winglet
Weight / CG	CG (X)	Center of Gravity Location (% MAC)

2.2.1.6.1. Sections

Data relative to all winglet sections

2.2.1.6.1.1. #1 – n

Data relative to one winglet section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (RI) (1)	X	Relative position along the longitudinal axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
List Airfoil Geometric Characteristics		To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics		To list the aerodynamic characteristics of the airfoil
Edit Shape		To edit the shape
		To open a technical note

2.2.1.6.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

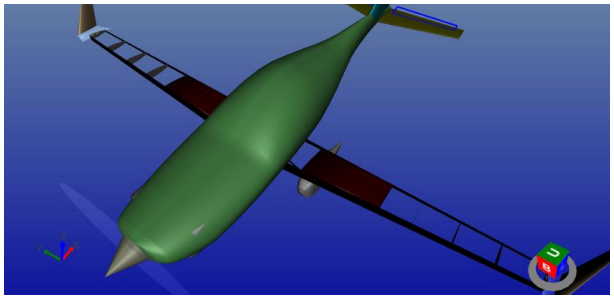
2.2.1.7. *Tanks*

Data relative to all tanks of the wing

Properties :		
General	Display All	To display or hide all tanks
	Has Identical 3D-Display	Specifies if the tanks are of identical 3D-Display
Contextual Menu :		
Right click :		
Add New Tank	To add a new Tank	

2.2.1.7.1. **#1 – n**

Data relative to one tank of the wing
Represented by the black boxes on the 3D-Model



Properties :		
General	Description	Name of the specific Tank
	Is Visible	To display or hide the tanks
Edge (LE/Inner)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)

Edge	Depth	Distance between the top/bottom of the tank and the skin of the lifting surface (% of lifting surface chord)
V3D-Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Tank	
Refresh	To compute the geometry and refresh the 3D-Model	
Compute Volume	To compute the volume of the tanks	

2.2.1.7.1.1. 3D Display

Definition of the representation of the wing tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

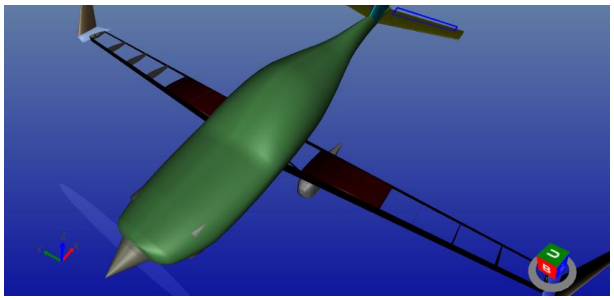
2.2.1.1. *Battery Packs*

Data relative to all battery packs of the wing

Contextual Menu :	
Right click :	
Add New Battery Pack	To add a new Battery Pack
Display Battery Packs	To display all Battery Packs
Hide Battery Packs	To hide all Battery Packs
Compute Volume	To compute the volume of all Battery Packs

2.2.1.1.1. **#1 – n**

Data relative to one battery pack of the wing
Represented by the black boxes on the 3D-Model



Properties :		
General	Description	Name of the specific battery pack
	Is Visible	To display or hide the battery packs
Edge (LE/Inner)	Chordwise	Position of the battery pack corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the battery pack corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Chordwise	Position of the battery pack corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the battery pack corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)

Edge	Depth	Distance between the top/bottom of the battery pack and the skin of the lifting surface (% of lifting surface chord)
V3D-Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected battery pack	
Refresh	To compute the geometry and refresh the 3D-Model	
Compute Geom-etry	To compute the geometry of the battery pack	

2.2.1.1.1.1. 3D Display

Definition of the representation of the wing tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.2.1.2. *Anchors*

Data relative to all anchors attached to the wing (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
General	Display All	To display or hide all Anchor Points
Contextual Menu :		
Right click :		
Add New Anchor	To add a new Anchor Point	

2.2.1.2.1. **#1 - n**

Data relative to one anchor attached to the wing

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the point
Position	Side	Location of the Anchor Point on the lifting surface
	Chordwise	Position along the chord (% of lifting surface chord)
	Spanwise	Position along the span (% of lifting surface span)
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove	To remove the selected Anchor Point	
Refresh	To compute the geometry and refresh the 3D-Model	

2.2.1.3. *3D Display*

Definition of the representation of the wing on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.3. Horizontal Tails

Data relative to all horizontal tails

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
	Standard Geometry	List of standard geometry definition - Trapezoidal - ESDU - Tip Based Cf.TN02-051 – Standard Geometry
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Position	Mounted on	List of possible location: - Fuselage - Vertical Tail - Boom

2.3.1. #1

Data relative to one Horizontal Tail

Subitems :	
Sections	Characteristics of the wing sections
Structure	Characteristics of the Structural parts
Elevators	Characteristics of the Elevators
Tanks	Characteristics of the Fuel Tanks
Anchors	Characteristics of the Anchors points
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (IC)	To display or hide all Internal Components (IC)
Configuration	Has Elevator	Specifies if it has Elevator. If not, the horizontal tail will be considered as All-Moving Tail (Stabilator)
	Has Tank	Specified if equipped with Tank
Configuration (Specific)	Has Anchors	Specifies if it has Anchor Points
Dimensions	Aspect Ratio	Aspect Ratio
	Taper Ratio	Taper Ratio
Deflection	Maximum (-)	Maximum negative deflection of the All-Moving Tail
	Maximum (+)	Maximum positive deflection of the All-Moving Tail
Geometry	Dihedral	Dihedral
	Sweep @ LE	Sweep measured at leading edge position
	Twist	Twist
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis

Stability	Tail Area / Wing Area	Tail Area / Wing Area
	Volume Coefficient	Volume coefficient
Weight / CG	CG (X)	Center of gravity location
	Weight	Weight (true weight)
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	
Compute Area	To compute the area	
Compute Geom-etry	To compute the geometry	
Display Internal Components	To display all internal components	
Hide Internal Components	To hide all internal components	
	To open a technical note	

(1) 

Use the scroll wheel to increment the furthest right digit

Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.3.1.1. *Sections*

Data relative to all tail sections

2.3.1.1.1. **#1 – n**

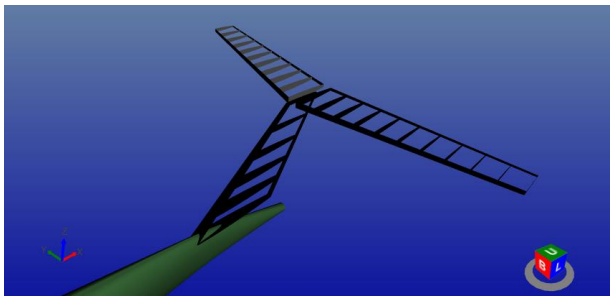
Data relative to one tail section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
	[Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections]
Mass	Mass Concentration Factor	Mass Concentration Factor used to distribute the mass along the span
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl) (1)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis

Contextual Menu :	
Right click :	
Insert New Cross Section	To insert a new Cross Section (before the selected one) Not possible if Computed for Design Level 1 & 2
Remove Cross Section	To remove the Selected Cross Section Not possible if Computed for Design Level 1 & 2
List Airfoil Geometric Characteristics	To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics	To list the aerodynamic characteristics of the airfoil
Edit Shape	To edit the shape
	To open a technical note

2.3.1.2. *Structure*

Data relative to the structural parts of the lifting surface



Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Spars	Characteristics of the spars
Ribs	Characteristics of the ribs

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Ribs	Specifies if it is built with Ribs
	Has Spars	Specify if it is built with Spars
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.3.1.2.1. Skins

Data relative to all skins of the lifting surface. The skin is defined @ the location of every section of the lifting surface. Only if Computed for Structural Analysis

Properties :		
General	Has Identical Material	Specifies if the Skins are made with identical material
	Has Identical Thickness	Specifies if the Skins are of identical thickness

2.3.1.2.1.1. #1 – n

Data relative to one skin of the lifting surface

Properties :		
General	Material	To specify the Material of the Skin located between the current section and the next one (outboard)
	Thickness (Inboard)	Thickness of the skin on the inboard side of the current section
	Thickness (Outboard)	Thickness of the skin on the outboard side of the current section
Interpolation	Mean Thickness Location	Position along the span, between the current section and the next one (outboard), where the local thickness is equal to the mean thickness. Mean Thickness = 0.5 * (# i $_{Thickness}$ + # i+1 $_{Thickness}$) If equal to 50%, means linear interpolation

2.3.1.2.2. Ribs

Data relative to all ribs of the lifting surface

Properties :		
General	Display All	To display or hide all ribs
	Number of Ribs (Default)	Default number of ribs along the span
Have Identical	3D-Display	Specifies if the Ribs are of identical 3D-Display
	Has Identical Material	Specifies if the Ribs are made with identical material
	Has Identical Thickness	Specifies if the Ribs are of identical thickness
	LE/TE Positions	Specifies if the Ribs have identical Start/End positions
	Number of points	Specifies if the Ribs are of identical definition
Contextual Menu :		
Right click :		
Compute Default Position		To compute the default position of ribs along the span. The number of ribs is defined by Number of Ribs (Default). Equal spacing between Ribs.

2.3.1.2.2.1. **#1 – n**

Data relative to one rib of the lifting surface

Properties :		
General	Is Visible	To display or hide the current Rib
	Material	To specify the Material of the current Rib
	Orientation	To specify the Orientation of the Rib
	Thickness	Thickness of the Rib
Edge (LE)	Chordwise	Distance from the Leading edge of the lifting surface to the Leading Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Front Spar	Specifies that the ribs starts at the Front-Spar position
Edge (TE)	Chordwise	Distance from the Leading edge of the lifting surface to the Trailing Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Rear Spar	Specifies that the ribs ends at the Rear-Spar position
Orientation	Stream Angle	Stream Angle
Position (Rl)	Spanwise	Position of the Rib along the span
V3D - Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Rib	
Insert New Rib	To insert a new Rib (before the selected one)	

2.3.1.2.2.1.1. *3D Display*

Definition of the representation of the rib on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.3.1.2.3. Spars

Data relative to all spars of the lifting surface

Properties :		
General	Display All	To display or hide all spars
	Has Identical Material	Specifies if the spars are made with identical material
	Has Identical Thickness	Specifies if the spars are of identical thickness
Configuration	Has Spar Box	Specifies if it has a spar box (connection between right and left spars)
Contextual Menu :		
Right click :		
Add New Spar		To add a new spar
Sort Spars		To sort the spars according to their position along the chord

2.3.1.2.3.1. #1 – n

Data relative to one spar of the lifting surface

Properties :		
General	Description	Name of the current Spar (LE, TE, …)
	Is Visible	To display or hide the spar
	Material	To specify the Material of the current Spar
	Thickness	Thickness of the Spar
Contextual Menu :		
Right click :		
Remove		To remove the selected spar

2.3.1.2.3.1.1. *#1 – n*

Data relative to one position of the spar at every lifting surface planform break position

Properties :		
Position	Chordwise	Position along the chord @ every lifting surface planform break position (% of lifting surface chord)
	Spanwise	Position along the span @ every lifting surface planform break position (computed value)

2.3.1.2.3.1.2. *3D Display*

Definition of the representation of the spar on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

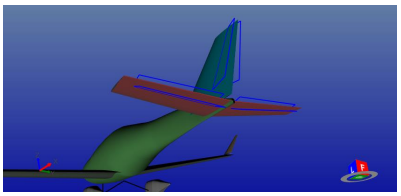
2.3.1.3. *Elevators*

Data relative to all elevators of the tail

Properties :		
General	Has Identical Material	Specifies if the Elevators are made with identical material
	Has Identical Thickness	Specifies if the Elevators are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Elevator		To add a new Elevator
Sort Elevators		To sort the Elevators according to their lateral position

2.3.1.3.1. **#1 – n**

Data relative to one elevator of the tail.
Represented by the blue lines on the 3D-Model



Properties :		
General	Material	To specify the Material of the current Elevator
	Thickness	Thickness of the Elevator's skin
Deflection	Maximum (-)	Maximum Negative Deflection (°)
	Maximum (+)	Maximum Positive Deflection (°)
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of HT chord)
	Relative chord (o)	Chord @ outboard position (% of HT chord)

Hinge Line	Hinge Axis Location	Hinge position (% of Elevator chord)
Position	Inboard	Position along the span @ inboard position (% of HT span)
	Outboard	Position along the span @ outboard position (% of HT span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Elevator
Compute Maximum Lift Increment		To compute the maximum lift increment according to the geometry of the elevator

2.3.1.4. *Tanks*

Data relative to all tanks of the tail

Properties :		
General	Display All	To display or hide all tanks
	Has identical 3D-Display	Specifies if the Tanks are of identical 3D-Display
Contextual Menu :		
Right click :		
Add New Tank		To add a new Tank

2.3.1.4.1. **#1 - n**

Data relative to one tank of the tail

Properties :		
General	Description	Name of the specific Tank
	Is Visible	To display or hide the tanks
Edge (LE/Inner)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)
Edge	Depth	Distance between the top/bottom of the tank and the skin of the lifting surface (% of lifting surface chord)
V3D - Geometry	Number of points	Specifies the number of points to define the shape

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Volume	To compute the volume of the tank

2.3.1.4.1.1. 3D Display

Definition of the representation of the tail tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.3.1.5. *Anchors*

Data relative to all anchors attached to the tail (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
General	Display All	To display or hide all Anchor Points
Contextual Menu :		
Right click :		
Add New Anchor	To add a new Anchor Point	

2.3.1.5.1. **#1 – n**

Data relative to one anchor attached to the tail

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the point
Position	Side	Location of the Anchor Point on the lifting surface
	Chordwise	Position along the chord (% of lifting surface chord)
	Spanwise	Position along the span (% of lifting surface span)
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove	To remove the selected Anchor Point	
Refresh	To compute the geometry and refresh the 3D-Model	

2.3.1.6. *3D Display*

Definition of the representation of the tail on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.4. Canard Surface

Data relative to all canard surfaces

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
	Standard Geometry	List of standard geometry definition - Trapezoidal - ESDU - Tip Based Cf.TN02-051 – Standard Geometry
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Position	Mounted on	List of possible location: - Fuselage - Vertical Tail - Boom

2.4.1. #1

Data relative to one Canard Surface

Subitems :	
Sections	Characteristics of the wing sections
Structure	Characteristics of the Structural parts
Canardvator	Characteristics of the Canardvators
Tanks	Characteristics of the Fuel Tanks
Anchors	Characteristics of the Anchors points
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (IC)	To display or hide all Internal Components (IC)
Configuration	Has Canardvators	Specifies if it has Canardvators
	Has Tank	Specified if equipped with Tank
Configuration (Specific)	Has Anchors	Specifies if it has Anchor Points
Dimensions	Aspect Ratio	Aspect Ratio
	Taper Ratio	Taper Ratio
Geometry	Dihedral	Dihedral
	Sweep @ LE	Sweep measured at leading edge position
	Twist	Twist
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Stability	Tail Area / Wing Area	Tail Area / Wing Area
	Volume Coefficient	Volume coefficient
Weight / CG	CG (X)	Center of gravity location
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To compute the geometry and refresh the 3D-Model
Compute Area	To compute the area
Compute Geom-etry	To compute the geometry
Display Internal Components	To display all internal components
Hide Internal Components	To hide all internal components
	To open a technical note

(1) 

Use the scroll wheel to increment the furthest right digit

Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.4.1.1. *Sections*

Data relative to all tail sections

2.4.1.1.1. **#1 – n**

Data relative to one tail section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
	[Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections]
Mass	Mass Concentration Factor	Mass Concentration Factor used to distribute the mass along the span
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl) (1)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis

Contextual Menu :	
Right click :	
Insert New Cross Section	To insert a new Cross Section (before the selected one) Not possible if Computed for Design Level 1 & 2
Remove Cross Section	To remove the Selected Cross Section Not possible if Computed for Design Level 1 & 2
List Airfoil Geometric Characteristics	To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics	To list the aerodynamic characteristics of the airfoil
Edit Shape	To edit the shape
	To open a technical note

2.4.1.2. *Structure*

Data relative to the structural parts of the lifting surface

Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Spars	Characteristics of the spars
Ribs	Characteristics of the ribs

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Ribs	Specifies if it is built with Ribs
	Has Spars	Specify if it is built with Spars
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.4.1.2.1. Skins

Data relative to all skins of the lifting surface. The skin is defined @ the location of every section of the lifting surface. Only if Computed for Structural Analysis

Properties :		
General	Has Identical Material	Specifies if the Skins are made with identical material
	Has Identical Thickness	Specifies if the Skins are of identical thickness

2.4.1.2.1.1. #1 – n

Data relative to one skin of the lifting surface

Properties :		
General	Material	To specify the Material of the Skin located between the current section and the next one (outboard)
	Thickness (Inboard)	Thickness of the skin on the inboard side of the current section
	Thickness (Outboard)	Thickness of the skin on the outboard side of the current section
Interpolation	Mean Thickness Location	Position along the span, between the current section and the next one (outboard), where the local thickness is equal to the mean thickness. Mean Thickness = 0.5 * (# i $_{Thickness}$ + # i+1 $_{Thickness}$) If equal to 50%, means linear interpolation

2.4.1.2.2. Ribs

Data relative to all ribs of the lifting surface

Properties :		
General	Display All	To display or hide all ribs
	Number of Ribs (Default)	Default number of ribs along the span
Have Identical	3D-Display	Specifies if the Ribs are of identical 3D-Display
	Has Identical Material	Specifies if the Ribs are made with identical material
	Has Identical Thickness	Specifies if the Ribs are of identical thickness
	LE/TE Positions	Specifies if the Ribs have identical Start/End positions
	Number of points	Specifies if the Ribs are of identical definition
Contextual Menu :		
Right click :		
Compute Default Position		To compute the default position of ribs along the span. The number of ribs is defined by Number of Ribs (Default). Equal spacing between Ribs.

2.4.1.2.2.1. **#1 – n**

Data relative to one rib of the lifting surface

Properties :		
General	Is Visible	To display or hide the current Rib
	Material	To specify the Material of the current Rib
	Orientation	To specify the Orientation of the Rib
	Thickness	Thickness of the Rib
Edge (LE)	Chordwise	Distance from the Leading edge of the lifting surface to the Leading Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Front Spar	Specifies that the ribs starts at the Front-Spar position
Edge (TE)	Chordwise	Distance from the Leading edge of the lifting surface to the Trailing Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Rear Spar	Specifies that the ribs ends at the Rear-Spar position
Orientation	Stream Angle	Stream Angle
Position (Rl)	Spanwise	Position of the Rib along the span
V3D - Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Rib	
Insert New Rib	To insert a new Rib (before the selected one)	

2.4.1.2.2.1.1. *3D Display*

Definition of the representation of the rib on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.4.1.2.3. Spars

Data relative to all spars of the lifting surface

Properties :		
General	Display All	To display or hide all spars
	Has Identical Material	Specifies if the spars are made with identical material
	Has Identical Thickness	Specifies if the spars are of identical thickness
Configuration	Has Spar Box	Specifies if it has a spar box (connection between right and left spars)
Contextual Menu :		
Right click :		
Add New Spar		To add a new spar
Sort Spars		To sort the spars according to their position along the chord

2.4.1.2.3.1. #1 – n

Data relative to one spar of the lifting surface

Properties :		
General	Description	Name of the current Spar (LE, TE, …)
	Is Visible	To display or hide the spar
	Material	To specify the Material of the current Spar
	Thickness	Thickness of the Spar
Contextual Menu :		
Right click :		
Remove		To remove the selected spar

2.4.1.2.3.1.1. *#1 – n*

Data relative to one position of the spar at every lifting surface planform break position

Properties :		
Position	Chordwise	Position along the chord @ every lifting surface planform break position (% of lifting surface chord)
	Spanwise	Position along the span @ every lifting surface planform break position (computed value)

2.4.1.2.3.1.2. *3D Display*

Definition of the representation of the spar on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.4.1.3. *Canardvator*

Data relative to all canardvators of the tail

Properties :		
General	Has Identical Material	Specifies if the Canardvators are made with identical material
	Has Identical Thickness	Specifies if the Canardvators are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Canardvator		To add a new Canardvator
Sort Canardvators		To sort the Canardvators according to their lateral position

2.4.1.3.1. **#1 – n**

Data relative to one canardvator of the tail.
Represented by the blue lines on the 3D-Model

Properties :		
General	Material	To specify the Material of the current Canardvator
	Thickness	Thickness of the Canardvator's skin
Deflection	Maximum (-)	Maximum Negative Deflection (°)
	Maximum (+)	Maximum Positive Deflection (°)
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of HT chord)
	Relative chord (o)	Chord @ outboard position (% of HT chord)

Hinge Line	Hinge Axis Location	Hinge position (% of Canardvator chord)
Position	Inboard	Position along the span @ inboard position (% of Canard Surface span)
	Outboard	Position along the span @ outboard position (% of Canard Surface span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Canardvator
Compute Maximum Lift Increment		To compute the maximum lift increment according to the geometry of the canardvator

2.4.1.4. *Winglet*

Data relative to the winglets of the canard surface

Subitems:	
Sections	Characteristics of the winglet sections
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Processing	Mass Equation	List of weight method prediction
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Geometry	Dihedral	Dihedral
	Radius (Fairing)	Radius of the junction between Wing and Winglet
Weight / CG	CG (X)	Center of Gravity Location (% MAC)

2.4.1.4.1. Sections

Data relative to all winglet sections

2.4.1.4.1.1. #1 – n

Data relative to one winglet section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
List Airfoil Geometric Characteristics		To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics		To list the aerodynamic characteristics of the airfoil
Edit Shape		To edit the shape
		To open a technical note

2.4.1.4.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.4.1.5. *Tanks*

Data relative to all tanks of the tail

Properties :		
General	Display All	To display or hide all tanks
	Has identical 3D-Display	Specifies if the Tanks are of identical 3D-Display
Contextual Menu :		
Right click :		
Add New Tank		To add a new Tank

2.4.1.5.1. **#1 - n**

Data relative to one tank of the tail

Properties :		
General	Description	Name of the specific Tank
	Is Visible	To display or hide the tanks
Edge (LE/Inner)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)
Edge	Depth	Distance between the top/bottom of the tank and the skin of the lifting surface (% of lifting surface chord)
V3D - Geometry	Number of points	Specifies the number of points to define the shape

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Volume	To compute the volume of the tank

2.4.1.5.1.1. 3D Display

Definition of the representation of the tail tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.4.1.6. *Anchors*

Data relative to all anchors attached to the tail (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
General	Display All	To display or hide all Anchor Points
Contextual Menu :		
Right click :		
Add New Anchor	To add a new Anchor Point	

2.4.1.6.1. **#1 – n**

Data relative to one anchor attached to the tail

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the point
Position	Side	Location of the Anchor Point on the lifting surface
	Chordwise	Position along the chord (% of lifting surface chord)
	Spanwise	Position along the span (% of lifting surface span)
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove	To remove the selected Anchor Point	
Refresh	To compute the geometry and refresh the 3D-Model	

2.4.1.7. *3D Display*

Definition of the representation of the tail on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.5. Vertical Tails

Data relative to all Vertical Tails

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
	Standard Geometry	List of standard geometry definition: - Trapezoidal - Tip Based Cf.TN02-051 – Standard Geometry
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Position	Mounted on	List of possible location: - Fuselage - Horizontal Tail - Boom - Wing

2.5.1. #1

Data relative to one Vertical Tail

Subitems :	
Sections	Characteristics of the wing sections
Structure	Characteristics of the Structural parts
Rudders	Characteristics of the Rudders
Tanks	Characteristics of the Fuel Tanks
Anchors	Characteristics of the Anchors points

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (IC)	To display or hide all Internal Components (IC)
Configuration	Has Rudder	Specifies if it has Rudder
	Has Tank	Specifies if it has Tank
Configuration (Specific)	Has Anchors	Specified if it has Anchor Points
Dimensions	Aspect Ratio	Aspect Ratio
	Taper Ratio	Taper Ratio
Geometry	Sweep @ LE	Sweep measured at leading edge position
Stability	Tail Area / Wing Area	Tail Area / Wing Area
	Volume Coefficient	Tail Volume Coefficient
Position (RI) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Weight / CG	CG (X)	Center of Gravity Location (%MAC)
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To compute the geometry and refresh the 3D-Model
Compute Area	To compute the area
Compute Geom-etry	To compute the geometry
Display Internal Components	To display all internal components
Hide Internal Components	To hide all internal components
	To open a technical note

(1) 

Use the scroll wheel to increment the furthest right digit

Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.5.1.1. *Sections*

Data relative to all tail sections

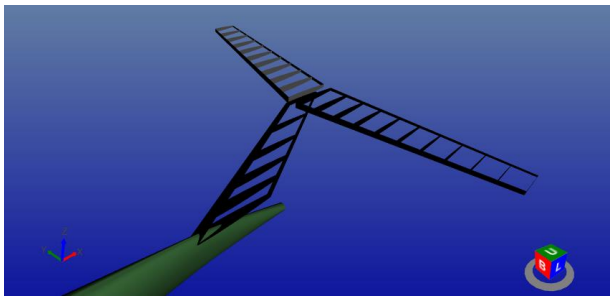
2.5.1.1.1. **#1**

Data relative to one tail section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
	[Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections]
Mass	Mass Concentration Factor	Mass Concentration Factor used to distribute the mass along the span
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl) (1)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Contextual Menu :		
Right click :		
Insert New Cross Section		To insert a new Cross Section (before the selected one) Not possible if Computed for Design Level 1 & 2
Remove Cross Section		To remove the Selected Cross Section Not possible if Computed for Design Level 1 & 2
List Airfoil Geometric Characteristics		To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics		To list the aerodynamic characteristics of the airfoil
Edit Shape		To edit the shape
		To open a technical note

2.5.1.2. *Structure*

Data relative to the structural parts of the lifting surface



Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Spars	Characteristics of the spars
Ribs	Characteristics of the ribs

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Ribs	Specifies if it is built with Ribs
	Has Spars	Specify if it is built with Spars
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.5.1.2.1.1. Skins

Data relative to all skins of the lifting surface. The skin is defined @ the location of every section of the lifting surface. Only if Computed for Structural Analysis

Properties :		
General	Has Identical Material	Specifies if the Skins are made with identical material
	Has Identical Thickness	Specifies if the Skins are of identical thickness

2.5.1.2.1.1.1. *#1 – n*

Data relative to one skin of the lifting surface

Properties :		
General	Material	To specify the Material of the Skin located between the current section and the next one (outboard)
	Thickness (Inboard)	Thickness of the skin on the inboard side of the current section
	Thickness (Outboard)	Thickness of the skin on the outboard side of the current section
Interpolation	Mean Thickness Location	Position along the span, between the current section and the next one (outboard), where the local thickness is equal to the mean thickness. Mean Thickness = 0.5 * (# i $_{\text{Thickness}}$ + # i+1 $_{\text{Thickness}}$) If equal to 50%, means linear interpolation

2.5.1.2.2. Ribs

Data relative to all ribs of the lifting surface

Properties :		
General	Display All	To display or hide all ribs
	Number of Ribs (Default)	Default number of ribs along the span
Have Identical	3D-Display	Specifies if the Ribs are of identical 3D-Display
	Has Identical Material	Specifies if the Ribs are made with identical material
	Has Identical Thickness	Specifies if the Ribs are of identical thickness
	LE/TE Positions	Specifies if the Ribs have identical Start/End positions
	Number of points	Specifies if the Ribs are of identical definition
Contextual Menu :		
Right click :		
Compute Default Position		To compute the default position of ribs along the span. The number of ribs is defined by Number of Ribs (Default). Equal spacing between Ribs.

2.5.1.2.2.1. **#1 – n**

Data relative to one rib of the lifting surface

Properties :		
General	Is Visible	To display or hide the current Rib
	Material	To specify the Material of the current Rib
	Orientation	To specify the Orientation of the Rib
	Thickness	Thickness of the Rib
Edge (LE)	Chordwise	Distance from the Leading edge of the lifting surface to the Leading Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Front Spar	Specifies that the ribs starts at the Front-Spar position
Edge (TE)	Chordwise	Distance from the Leading edge of the lifting surface to the Trailing Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Rear Spar	Specifies that the ribs ends at the Rear-Spar position
Orientation	Stream Angle	Stream Angle
Position (Rl)	Spanwise	Position of the Rib along the span
V3D - Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Rib	
Insert New Rib	To insert a new Rib (before the selected one)	

2.5.1.2.2.1.1. *3D Display*

Definition of the representation of the rib on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.5.1.2.3. Spars

Data relative to all spars of the lifting surface

Properties :		
General	Display All	To display or hide all spars
	Has Identical Material	Specifies if the spars are made with identical material
	Has Identical Thick-ness	Specifies if the spars are of identical thickness
Contextual Menu :		
Right click :		
Add New Spar		To add a new spar
Sort Spars		To sort the spars according to their position along the chord

2.5.1.2.3.1. #1 – n

Data relative to one spar of the lifting surface

Properties :		
General	Description	Name of the current Spar (LE, TE, …)
	Is Visible	To display or hide the spar
	Material	To specify the Material of the current Spar
	Thickness	Thickness of the spar
Contextual Menu :		
Right click :		
Remove		To remove the selected spar

2.5.1.2.3.1.1. *#1 – n*

Data relative to one position of the spar at every lifting surface planform break position

Properties :		
Position	Chordwise	Position along the chord @ every lifting surface planform break position (% of lifting surface chord)
	Spanwise	Position along the span @ every lifting surface planform break position (computed value)

2.5.1.2.3.1.2. *3D Display*

Definition of the representation of the spar on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.5.1.3. *Rudders*

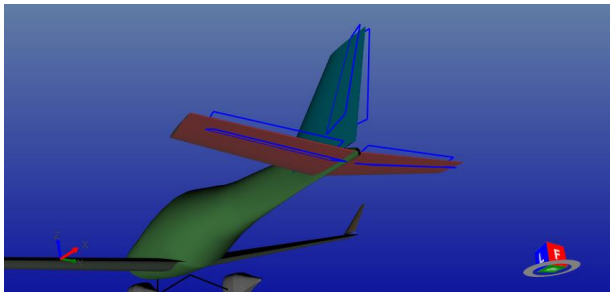
Data relative to all rudders of the tail

Properties :		
General	Has Identical Material	Specifies if the Rudders are made with identical material
	Has Identical Thickness	Specifies if the Rudders are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Rudder		To add a new Rudder
Sort Rudders		To sort the Rudders according to their vertical position

2.5.1.3.1. **#1**

Data relative to one rudder of the tail.

Represented by the blue lines on the 3D-Model



Properties :		
General	Material	To specify the Material of the current Rudder
	Thickness	Thickness of the Rudder's skin
Deflection	Maximum (-)	Maximum Negative Deflection (°)
	Maximum (+)	Maximum Positive Deflection (°)
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of VT chord)
	Relative chord (o)	Chord @ outboard position (% of VT chord)
Hinge Line	Hinge Axis Location	Hinge position (% of Rudder chord)
Position	Inboard	Position along the span @ inboard position (% of VT span)
	Outboard	Position along the span @ outboard position (% of VT span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Rudder

2.5.1.4. *Tanks*

Data relative to all tanks of the tail

Properties :		
General	Display All	To display or hide all tanks
Contextual Menu :		
Right click :		
Add New Tank	To add a new Tank	

2.5.1.4.1. **#1 - n**

Properties :		
General	Description	Name of the specific Tank
	Is Visible	To display or hide the tanks
Edge (LE/Inner)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)
Edge	Depth	Distance between the top/bottom of the tank and the skin of the lifting surface (% of lifting surface chord)
V3D - Geometry	Number of points	Specifies the number of points to define the shape

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Volume	To compute the volume of the tank

2.5.1.4.1.1. 3D Display

Definition of the representation of the tail tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.5.1.5. *Anchors*

Data relative to all anchors attached to the tail (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
General	Display All	To display or hide all Anchor Points
Contextual Menu :		
Right click :		
Add New Anchor	To add a new Anchor Point	

2.5.1.5.1.1. **#1 – n**

Data relative to one anchor attached to the tail

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the point
Position	Side	Location of the Anchor Point on the lifting surface
	Chordwise	Position along the chord (% of lifting surface chord)
	Spanwise	Position along the span (% of lifting surface span)
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove	To remove the selected Anchor Point	
Refresh	To compute the geometry and refresh the 3D-Model	

2.5.1.6. *3D Display*

Definition of the representation of the tail on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.6. V-Tails

Data relative to all V-Tails

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
	Standard Geometry	List of standard geometry definition - Trapezoidal - ESDU - Tip Based Cf.TN02-051 – Standard Geometry
Aerodynamics	Transition	Position on the chord where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity Used only if no aerodynamic data is available for the airfoil profile
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Position	Mounted on	List of possible location: - Fuselage - Boom

2.6.1. #1

Data relative to one V-Tail

Subitems :	
Sections	Characteristics of the V-Tail sections
Structure	Characteristics of the Structural parts
Ruddervators	Characteristics of the Ruddervators
Tanks	Characteristics of the Fuel Tanks
Anchors	Characteristics of the Anchors points
3D Display	

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (Tails)	To display or hide the equivalent Horizontal Tail and Vertical Tail
	Is Visible (IC)	To display or hide all Internal Components (IC)
Configuration	Has Ruddervator	Specifies if it has Ruddervator
	Has Tank	Specified if equipped with Tank
Configuration (Specific)	Has Anchors	Specifies if it has Anchor Points
Dimensions	Aspect Ratio	Aspect Ratio
	Taper Ratio	Taper Ratio
Geometry	Dihedral	Dihedral
	Sweep @ LE	Sweep measured at leading edge position
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Stability	Tail Area / Wing Area	Tail Area / Wing Area
	Volume Coefficient	Volume coefficient
Weight / CG	CG (X)	Center of gravity location
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To compute the geometry and refresh the 3D-Model
Compute Area	To compute the area
Compute Geom-etry	To compute the geometry
Display Internal Components	To display all internal components
Hide Internal Components	To hide all internal components
	To open a technical note

(1) 

Use the scroll wheel to increment the furthest right digit

Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.6.1.1. *Sections*

Data relative to all tail sections

2.6.1.1.1. **#1 – n**

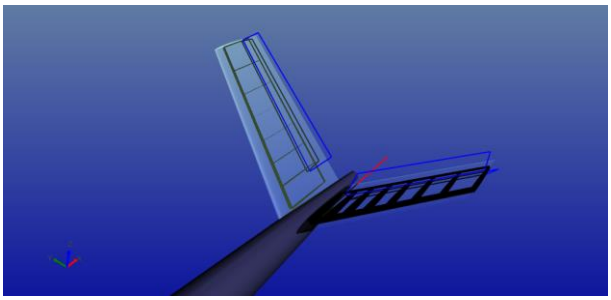
Data relative to one tail section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
	[Area (LS)]	Projected area of the lifting surface [computed from the position and dimensions of the different cross sections]
Mass	Mass Concentration Factor	Mass Concentration Factor used to distribute the mass along the span
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl) (1)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis

Contextual Menu :	
Right click :	
Insert New Cross Section	To insert a new Cross Section (before the selected one) Not possible if Computed for Design Level 1 & 2
Remove Cross Section	To remove the Selected Cross Section Not possible if Computed for Design Level 1 & 2
List Airfoil Geometric Characteristics	To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics	To list the aerodynamic characteristics of the airfoil
Edit Shape	To edit the shape
	To open a technical note

2.6.1.2. *Structure*

Data relative to the structural parts of the lifting surface



Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Spars	Characteristics of the spars
Ribs	Characteristics of the ribs

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Ribs	Specifies if it is built with Ribs
	Has Spars	Specify if it is built with Spars
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.6.1.2.1. Skins

Data relative to all skins of the lifting surface. The skin is defined @ the location of every section of the lifting surface. Only if Computed for Structural Analysis

Properties :		
General	Has Identical Material	Specifies if the Skins are made with identical material
	Has Identical Thickness	Specifies if the Skins are of identical thickness

2.6.1.2.1.1. #1 – n

Data relative to one skin of the lifting surface

Properties :		
General	Material	To specify the Material of the Skin located between the current section and the next one (outboard)
	Thickness (Inboard)	Thickness of the skin on the inboard side of the current section
	Thickness (Outboard)	Thickness of the skin on the outboard side of the current section
Interpolation	Mean Thickness Location	Position along the span, between the current section and the next one (outboard), where the local thickness is equal to the mean thickness. Mean Thickness = 0.5 * (# i $_{Thickness}$ + # i+1 $_{Thickness}$) If equal to 50%, means linear interpolation

2.6.1.2.2. Ribs

Data relative to all ribs of the lifting surface

Properties :		
General	Display All	To display or hide all ribs
	Number of Ribs (Default)	Default number of ribs along the span
Have Identical	3D-Display	Specifies if the Ribs are of identical 3D-Display
	Has Identical Material	Specifies if the Ribs are made with identical material
	Has Identical Thickness	Specifies if the Ribs are of identical thickness
	LE/TE Positions	Specifies if the Ribs have identical Start/End positions
	Number of points	Specifies if the Ribs are of identical definition
Contextual Menu :		
Right click :		
Compute Default Position		To compute the default position of ribs along the span. The number of ribs is defined by Number of Ribs (Default). Equal spacing between Ribs.

2.6.1.2.2.1. **#1 – n**

Data relative to one rib of the lifting surface

Properties :		
General	Is Visible	To display or hide the current Rib
	Material	To specify the Material of the current Rib
	Orientation	To specify the Orientation of the Rib
	Thickness	Thickness of the Rib
Edge (LE)	Chordwise	Distance from the Leading edge of the lifting surface to the Leading Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Front Spar	Specifies that the ribs starts at the Front-Spar position
Edge (TE)	Chordwise	Distance from the Leading edge of the lifting surface to the Trailing Edge of the rib (% of lifting surface chord)
	Depth	Define the distance between the rib and the skin of the lifting surface (% of lifting surface chord)
	Rear Spar	Specifies that the ribs ends at the Rear-Spar position
Orientation	Stream Angle	Stream Angle
Position (Rl)	Spanwise	Position of the Rib along the span
V3D - Geometry	Number of points	Specifies the number of points to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Rib	
Insert New Rib	To insert a new Rib (before the selected one)	

2.6.1.2.2.1.1. *3D Display*

Definition of the representation of the rib on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.6.1.2.3. Spars

Data relative to all spars of the lifting surface

Properties :		
General	Display All	To display or hide all spars
	Has Identical Material	Specifies if the spars are made with identical material
	Has Identical Thickness	Specifies if the spars are of identical thickness
Configuration	Has Spar Box	Specifies if it has a spar box (connection between right and left spars)
Contextual Menu :		
Right click :		
Add New Spar		To add a new spar
Sort Spars		To sort the spars according to their position along the chord

2.6.1.2.3.1. #1 – n

Data relative to one spar of the lifting surface

Properties :		
General	Description	Name of the current Spar (LE, TE, …)
	Is Visible	To display or hide the spar
	Material	To specify the Material of the current Spar
	Thickness	Thickness of the Spar
Contextual Menu :		
Right click :		
Remove		To remove the selected spar

2.6.1.2.3.1.1. *#1 – n*

Data relative to one position of the spar at every lifting surface planform break position

Properties :		
Position	Chordwise	Position along the chord @ every lifting surface planform break position (% of lifting surface chord)
	Spanwise	Position along the span @ every lifting surface planform break position (computed value)

2.6.1.2.3.1.2. *3D Display*

Definition of the representation of the spar on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

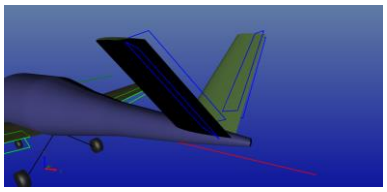
2.6.1.3. *Ruddervators*

Data relative to all ruddervators of the tail

Properties :		
General	Has Identical Material	Specifies if the Ruddervators are made with identical material
	Has Identical Thickness	Specifies if the Ruddervators are of identical thickness
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Contextual Menu :		
Right click :		
Add New Ruddervator		To add a new Ruddervator

2.6.1.3.1. **#1 – n**

Data relative to one ruddervator of the tail.
Represented by the blue lines on the 3D-Model



Properties :		
General	Material	To specify the Material of the current Elevator
	Thickness	Thickness of the Elevator's skin
Deflection	Maximum (-)	Maximum Negative Deflection (°)
	Maximum (+)	Maximum Positive Deflection (°)
Dimensions	[Area]	Total area of the control surface (calculated from the relative position and dimensions of the moving surface)
	[Chord (i)]	Root Chord (calculated from the relative position and dimension of the moving surface)
	[Chord (o)]	Tip Chord (calculated from the relative position and dimension of the moving surface)
	Relative chord (i)	Chord @ inboard position (% of HT chord)
	Relative chord (o)	Chord @ outboard position (% of HT chord)

Hinge Line	Hinge Axis Location	Hinge position (% of Elevator chord)
Position	Inboard	Position along the span @ inboard position (% of HT span)
	Outboard	Position along the span @ outboard position (% of HT span)
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove		To remove the selected Elevator
Compute Maximum Lift Increment		To compute the maximum lift increment according to the geometry of the elevator

2.6.1.4. *Tanks*

Data relative to all tanks of the tail

Properties :		
General	Display All	To display or hide all tanks
	Has identical 3D-Display	Specifies if the Tanks are of identical 3D-Display
Contextual Menu :		
Right click :		
Add New Tank		To add a new Tank

2.6.1.4.1. **#1 - n**

Data relative to one tank of the tail

Properties :		
General	Description	Name of the specific Tank
	Is Visible	To display or hide the tanks
Edge (LE/Inner)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ inboard position and @ the leading edge position of the lifting surface (% of lifting surface span)
Edge (TE/Outer)	Orientation	To specify the orientation of the Edge
	Chordwise	Position of the tank corner along the chord @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface chord)
	Spanwise	Position of the tank corner along the span @ outboard position and @ the trailing edge position of the lifting surface (% of lifting surface span)
Edge	Depth	Distance between the top/bottom of the tank and the skin of the lifting surface (% of lifting surface chord)
V3D - Geometry	Number of points	Specifies the number of points to define the shape

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Volume	To compute the volume of the tank

2.6.1.4.1.1. 3D Display

Definition of the representation of the tail tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.6.1.5. *Anchors*

Data relative to all anchors attached to the tail (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
General	Display All	To display or hide all Anchor Points
Contextual Menu :		
Right click :		
Add New Anchor	To add a new Anchor Point	

2.6.1.5.1. **#1 – n**

Data relative to one anchor attached to the tail

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the point
Position	Side	Location of the Anchor Point on the lifting surface
	Chordwise	Position along the chord (% of lifting surface chord)
	Spanwise	Position along the span (% of lifting surface span)
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove	To remove the selected Anchor Point	
Refresh	To compute the geometry and refresh the 3D-Model	

2.6.1.6. *3D Display*

Definition of the representation of the tail on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency
	Opacity (Tails)	Specifies the level of Opacity of the equivalent Horizontal Tail and Vertical Tail (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.7. Fuselages

Data relative to all fuselages

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
Aerodynamics	Transition	Position on the fuselage where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.7.1. #1

Data relative to one Fuselage

Subitems :	
Geometry	Geometry of the fuselage
Structure	Characteristics of the Structural parts
Interior Layout	Characteristics of the Interior
Doors	Characteristics of the Doors
Windows	Characteristics of the Windows
Dorsal Fin	Characteristics of the dorsal fin
Ventral Fin	Characteristics of the ventral fin
Tanks	Characteristics of the Fuel Tanks
Protuberances	Characteristics of the Protuberances
Anchors	Characteristics of the Anchors points
Crew Members	Characteristics of the Crew Members
3D Display	

Properties :		
General	Is Visible	To display or hide the fuselage Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
	Is Visible (Occupants)	To display or hide all Occupants
	Is Visible (IC)	To display or hide all Internal Components (IC)
Configuration	Has Fin - Dorsal	Specifies if it has Dorsal Fin
	Has Fin - Ventral	Specifies if it has Ventral Fin
	Has Protuberance	Specifies if it has Protuberance
	Has Tank	Specifies if it has Tank
Configuration (Specific)	Has Anchors	Specified if it has Anchor Points

Keel	Surface Roughness	Surface roughness of the keel, which has an influence on the coefficient of frictional resistance - 0.0120 to 0.0100 Smooth Surface - 0.0231 to 0.0137 Fine Grit Sandpaper - 0.0257 to 0.0152 Medium Grit Sandpaper - 0.0314 to 0.1680 Coarse Grit Sandpaper
Position (Rl) [(1)]	X	Relative position along the longitudinal axis
	Z	Relative position along the vertical axis
Processing	Auto Update Length	To update the length of the fuselage during the run
Weight	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To compute the geometry and refresh the 3D-Model
Compute Geometry	To compute the geometry and display the results in the output window
Display Internal Components	To display all internal components (structure, tanks…)
Hide Internal Components	To hide all internal components (structure, tanks…)

(1) Use the scroll wheel to increment the furthest right digit

Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

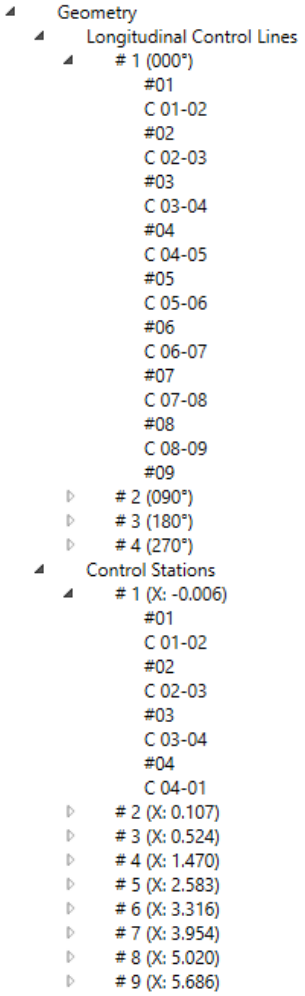
2.7.1.1. *Geometry*

The Geometry is defined from:

1. 4 longitudinal control lines (LCL)
2. A given number of Control Stations (CtS)

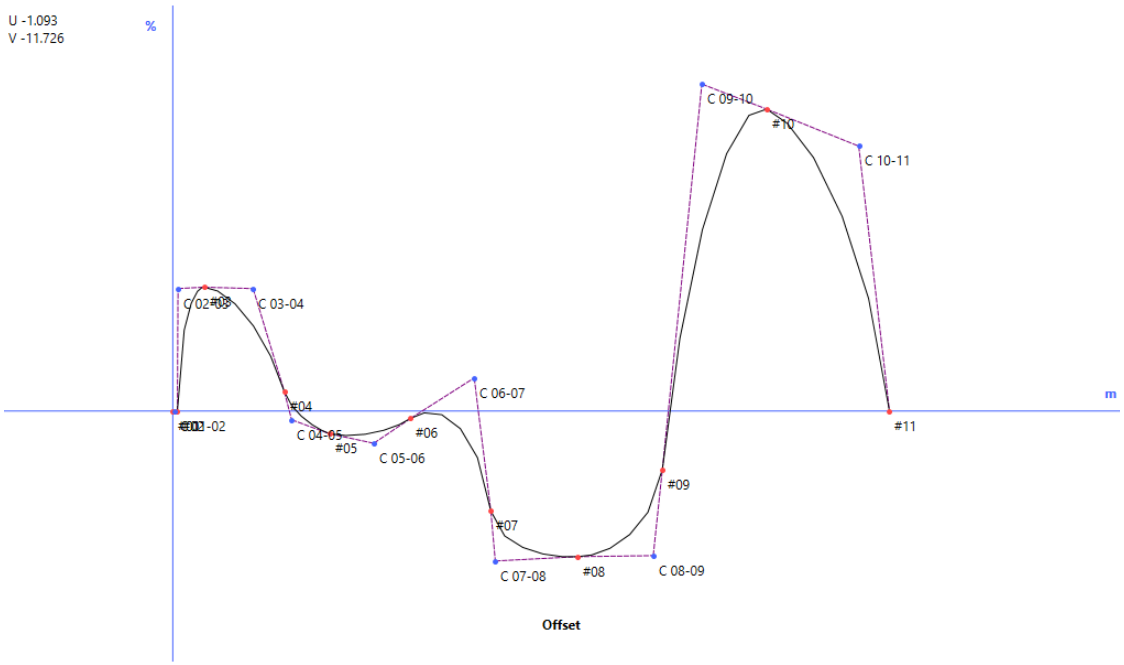
Every LCL and CtS are defined from:

1. A given number of Control Points (#01)
2. A given number of Conics (C 01-02)



Properties :		
Processing	Refresh in Real-Time	To refresh in Real-Time the 3D-Model. Real-time refresh can lengthen computation time and make it difficult to move points on the screen. To refresh the 3D model at any time, select it in the TreeView or on the screen, then press F5

Contextual Menu :	
Right click :	
Stretch the Body	To stretch the geometry and refresh the 3D-Model
Update Length	To update the length of the geometry and refresh the 3D-Model
Compute the Volume of the Body	To compute the volume of the geometry and refresh the 3D-Model
Edit CSP	To open the Control Line Editor and display the evolution of the Conic Shape Parameter (CSP) along the longitudinal axis of the body
Edit DZ	To open the Control Line Editor and display the evolution of the vertical position of the center of the Control Station along the longitudinal axis of the body
Edit Offset	To open the Control Line Editor and display the evolution of the offset along the longitudinal axis of the body
View Wetted Area Plot	To display the body wetted area plot (evolution of the perimeter of the cross section along the longitudinal axis of the body)
View Volume Plot	To display the body volume plot (evolution of the cross section area along the longitudinal axis of the body)



2.7.1.1.1. Longitudinal Control Lines

Every Longitudinal Control Line (LCL) is defined from:

1. A given number of Control Points (#01, …)
2. A given number of Conics (C 01-02, …)

Contextual Menu :	
Right click :	
Edit LCLs	To open the LCLs Editor

2.7.1.1.1.1. #1 – n

Data relative to one control point

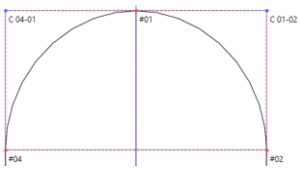
 indicates that the Control Point is locked, due to the fact that the corresponding Control Station is of circular shape. The displacement of the point must be done through the Control Stations entry.

Properties :		
General	Tangent Continuity	Has tangent continuity at the control point
Control Point (CP0)	U	Position along the horizontal axis
	V	Position along the vertical axis

2.7.1.1.1.2. C 01-02 – n

Data relative to one conic

Properties :		
General	DivMode	Mode of division of the conic: - Proportional - Cos - Sin - Parametric Defines the distribution of points on the curve
	Number of Points	Number of points to define the conic
Control Point (CPi)	U	Position along the horizontal axis
	V	Position along the vertical axis
Geometry	(0) Tangent Angle	Tangent angle @ the first point of the conic
	(1) Tangent Angle	Tangent angle @ the last point of the conic
	CSP	Conic Shape Parameter. Defines the shape of the curve

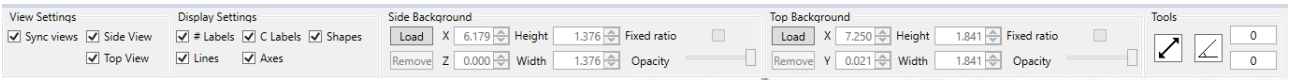


CSP : 0.42

CSP : 0.85

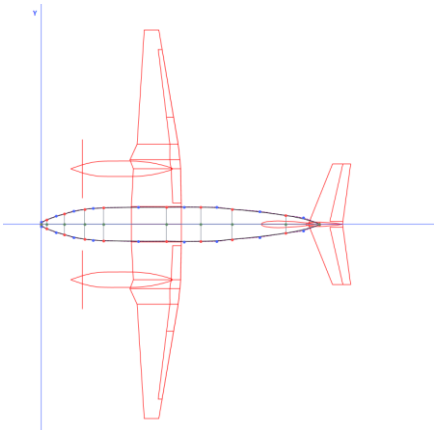
2.7.1.1.1.3. LCL Editor

Tool to use to modify the longitudinal control lines of the body



Top Menu :		
View Settings	Sync Views	To synchronize the top and side views when panning (left click)
	Side View	To display the Side View (XZ)
	Top View	To display the Top View (XY)
Display Settings	# Labels	To display labels relative to the control points (#1,…)
	C Labels	To display labels relative to the conics (C01-02,…)
	Lines	To display control Lines
	Axes	To display Main Axis (OX, OY, OZ)
	Shapes	To display the other components of the airplane
Side Background	Load	To load a background image
	Remove	To remove the background image
	Rot	To rotate the background image
	X	Position along the X-axis
	Z	Position along the Z-axis
	Height	Height
	Width	Width
	Fixed Ratio	To keep the same proportion (Width/Height)
	Opacity	To modify the opacity
Top Background	Load	To load a background image
	Remove	To remove the background image
	X	Position along the X-axis
	Y	Position along the Y-axis
	Height	Height
	Width	Width
	Fixed Ratio	To keep the same proportion (Width/Height)
	Opacity	To modify the opacity
Tools	Measure Distance	To Measure a distance (2 clicks on the screen)

Measure Angle	To measure an angle (3 clicks on the screen)



Contextual Menu :	
Left press & Move the mouse :	
	To move the view
Right click :	
Insert New Control Station	To insert a new Control Station @ the position of the mouse on the screen
Remove Closest Control Station	To remove the closest Control Station from the position of the mouse on the screen

Points displacement :	
Red Points	
Press the left button of the mouse & Move the mouse	To move the point in any direction
Press the left button of the mouse + Press keyboard key “u” down & Move the mouse	To move the point in the vertical direction ONLY (block movement in u)
Press the left button of the mouse + Press keyboard key “v” down & Move the mouse	To move the point in the horizontal direction ONLY (block movement in v)
Blue points	
Press the left button of the mouse & Move the mouse	To move the point in any direction
Green points (center of the Control Station)	
Press the left button of the mouse & Move the mouse	To move the control station in the vertical direction ONLY

2.7.1.1.2. Control Stations

Every Control Station (CtS) is defined from:

1. A given number of Control Points (#01, …)
2. A given number of Conics (C 01-02, …)

Properties :		
Processing	Refresh in Real-Time	To refresh in Real-Time the 3D-Model. Real-time refresh can lengthen computation time and make it difficult to move points on the screen. To refresh the 3D model at any time, select it in the TreeView or on the screen, then press F5

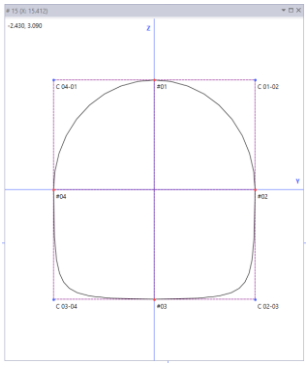
Contextual Menu :	
Right click :	
Force to Cross Section in Circumscribed Rectangle	Every Cross Section will be circumscribed in a rectangle. This imposes: 1. The respect of the condition of tangency
Force to Cross Section of Elliptical Shape	Every Cross Section will be of elliptical shape. This imposes: 1. The respect of the condition of tangency 2. No offset (Offset = 0) 3. Conic Shape Parameter (CSP) equals to 0.4142
Force to Cross Section of Circular Shape	Every Cross Section will be of circular shape. This imposes: 1. Same Maximum Height and Maximum Width 2. The respect of the condition of tangency 3. No offset (Offset = 0) 4. Conic Shape Parameter (CSP) equals to 0.4142

2.7.1.1.2.1. #1 – n

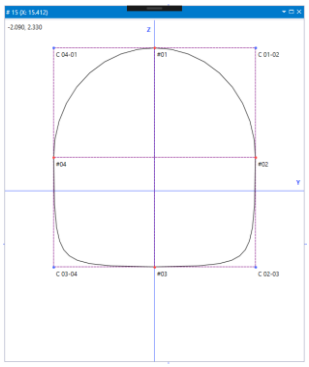
Data relative to one Control Station (CtS)

Properties :		
General	Is Circular	Specify if the CtS is a circular shape ⊙ indicates that the Control Section is circular
Dimensions	Maximum Height	Maximum height (enabled only if the CtS is circular)
	Maximum Width	Maximum width (enabled only if the CtS is circular)
Position	DZ	Define the vertical position of the center of the CtS from the axis of the body (blue lines)
Shape	Offset	Define the position of the horizontal axis from the center of the CtS (disabled if the CtS is circular)

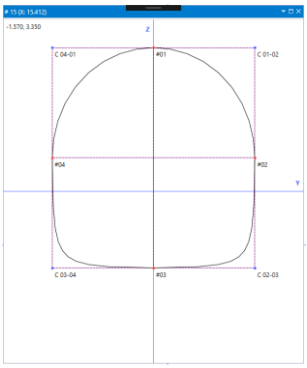
Contextual Menu :	
Right click :	
Remove Control Station	To remove the selected Control Station
Insert New Control Station	To insert a new Control Station **before** the selected one
Force to Cross Section in Circumscribed Rectangle	The current Cross Section will be circumscribed in a rectangle. This imposes: 1. The respect of the condition of tangency
Force to Cross Section of Elliptical Shape	The current Cross Section will be of elliptical shape. This imposes: 1. The respect of the condition of tangency 2. No offset (Offset = 0) 3. Conic Shape Parameter (CSP) equals to 0.4142
Align all Sections on the Current One	All sections will be aligned on the current one. This imposes: 1. Same vertical position (DZ)
Edit Shape	To open the CtS Editor



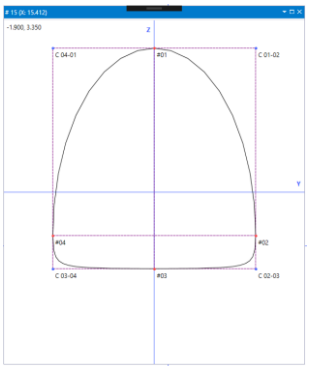
DZ : 0 m



DZ : 0.66 m



Offset : 0%



Offset: -35%

2.7.1.1.2.1.1. *#1 - n*

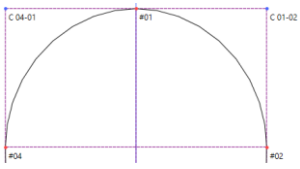
Data relative to one control point

Properties :		
Control Point (CP0)	U	Position along the horizontal axis
	V	Position along the vertical axis

2.7.1.1.2.1.2. *C 01-02 – n*

Data relative to one conic

Properties :		
General	DivMode	Mode of division of the conic: - Proportional - Cos - Sin - Parametric Defines the distribution of points on the curve
	Number of Points	Number of points to define the conic
Control Point (CPi)	U	Position along the horizontal axis
	V	Position along the vertical axis
Geometry	(0) Tangent Angle	Tangent angle @ the first point of the conic
	(1) Tangent Angle	Tangent angle @ the last point of the conic
	CSP	Conic Shape Parameter Defines the shape of the curve

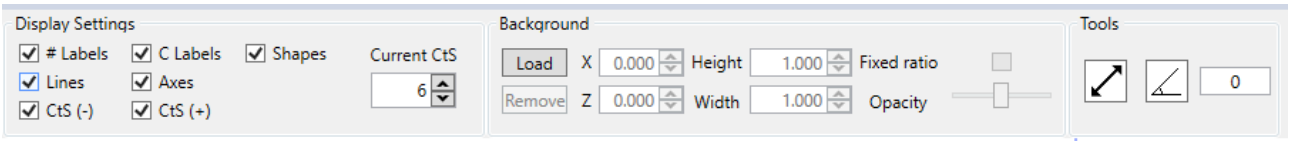


CSP : 0.42

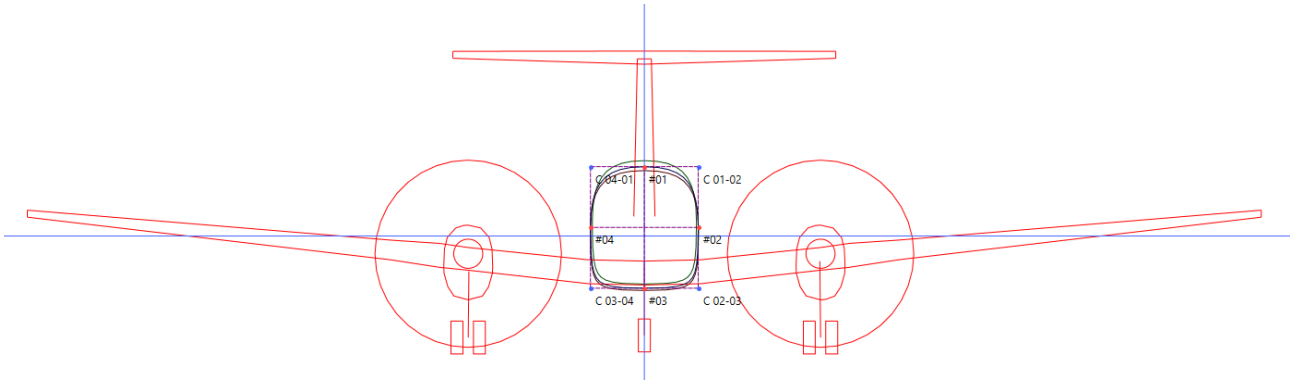
CSP : 0.85

2.7.1.1.2.1.3. *CtS Editor*

Tool to use to modify the control stations of the body



Top Menu :		
Display Settings	# Labels	To display labels relative to the control points (#1,…)
	C Labels	To display labels relative to the conics (C01-02,…)
	Lines	To display control Lines
	Axes	To display Main Axis (OY, OZ)
	CtS (-)	To display the previous CtS (green)
	CtS (+)	To display the next CtS (red)
	Shapes	To display the other components of the airplane
	Current CtS	To select the current CtS
Background	Load	To load a background image
	Remove	To remove the background image
	Rot	To rotate the background image
	X	Position along the X-axis
	Z	Position along the Z-axis
	Height	Height
	Width	Width
	Fixed Ratio	To keep the same proportion (Width/Height)
	Opacity	To modify the opacity
Tools	Measure Distance	To Measure a distance (2 clicks on the screen)
	Measure Angle	To measure an angle (3 clicks on the screen)



Contextual Menu :	
Left press & Move the mouse :	
	To move the view
Left click on red points (crossing points):	
	To change the size of the CtS
Left click on bleu points (control points):	
	To change the shape of the CtS (in combination with CSP)

2.7.1.2. *Structure*

Data relative to the structural parts of the fuselage (**specific to Structural Analysis**)

Subitems:	
Skins	Characteristics of the skin Only if Computed for Structural Analysis
Frames	Characteristics of the frames

Properties :		
General	Display All	To display or hide all the structural parts
Configuration	Has Frame	Specifies if it is built with Frames

2.7.1.2.1. Skin

Data relative to the skin of the fuselage. Only if Computed for Structural Analysis

Properties :		
General	Material	To specify the Material of the Skin
	Thickness	Thickness of the skin

2.7.1.2.2. Frames

Data relative to the frames of the fuselage

Properties :		
General	Frame Depth	Depth of the frame
	Frame Spacing	Distance between Frames
	Is Visible	To display or hide the Frames
	Material	To specify the Material for all Frames
	Thickness	Thickness of the Frame
Position (Edge)	Front	Longitudinal position of the first Frame
Contextual Menu :		
Right click :		
Refresh		To compute the geometry and refresh the 3D-Model

2.7.1.3. *Interior Layout*

Data relative to the internal components of the fuselage (**specific to Airliners**)

Subitems:	
Flight Deck	Characteristics of the Flight Deck
Cabin	Characteristics of the Cabin
Cargo Bays	Characteristics of the Cargo Bays
Gear Bays	Characteristics of the Gear Bays
Bulkheads	Characteristics of the Bulkheads

Properties :		
General	Display All	To display or hide all the Interior parts
Configuration	Has Bulkhead	Specifies if it has Bulkhead
	Has Cabin	Specifies if it has Cabin
	Has Cargo Bay	Specifies if it has Cargo Bay
	Has Flight Deck	Specifies if it has Flight Deck
	Has Gear Bay	Specifies if it has Gear Bay

2.7.1.3.1. Flight Deck

Data relative to the Flight Deck

Properties :		
General	Is Visible	To display or hide the Flight Deck
Position (Rl) / Size	Floor	Vertical position of the floor
	Front	Longitudinal position of the front wall
	Height	Distance between the floor and the ceiling
	Length	Distance between the front wall and the back wall
Pressurization	Is Pressurized	Specifies if it is pressurized
	Pressure (Delta)	Maximum delta pressure between the inside and out-side of the Flight Deck
Structural Design	Loading	Maximum floor loading
	Floor Thickness	Floor thickness
	Wall Thickness	Wall thickness
V3D - Geometry	Number of Frames	Specifies the number of Frames to define the shape
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.3.2. Cabin

Data relative to the Cabin

Properties :		
General	Is Visible	To display or hide the Cabin
Position (Rl) / Size	Floor	Vertical position of the floor
	Front	Longitudinal position of the front wall
	Height	Distance between the floor and the ceiling
	Length	Distance between the front wall and the back wall
Pressurization	Is Pressurized	Define if it is pressurized
	Pressure (Delta)	Maximum delta pressure between the inside and out-side of the Cabin
Structural Design	Loading	Maximum floor loading
	Floor Thickness	Floor thickness
	Wall Thickness	Wall thickness
V3D - Geometry	Number of Frames	Specifies the number of Frames to define the shape
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.3.3. Cargo Bays

Data relative to all Cargo Bays

Contextual Menu :	
Right click :	
Add New Cargo Bay	To add a new Cargo Bay

2.7.1.3.3.1. #1 - n

Data relative to one Cargo Bay

Properties :		
General	Description	Name of the specific Cargo Bay (Front, Rear,…)
	Has Restricted Width	Specifies if the width is restricted. If not, the width will be limited by the wall of the fuselage
	Is Visible	To display or hide the current Cargo Bay
Position (Rl) / Size	Floor	Vertical position of the floor
	Front	Longitudinal position of the front wall
	Height	Distance between the floor and the ceiling
	Length	Distance between the front wall and the back wall
	Type	List of possible type of Freight
	Width	Width
Structural Design	Loading	Maximum floor loading
	Floor Thickness	Floor thickness
	Wall Thickness	Wall thickness
V3D - Geometry	Number of Frames	Specifies the number of Frames to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Cargo Bay	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.3.4. Gear Bays

Data relative to all Gear Bays

Contextual Menu :	
Right click :	
Add New Gear Bay	To add a new Gear Bay

2.7.1.3.4.1. #1 – n

Data relative to one Gear Bay

Properties :		
General	Description	Name of the specific Gear Bay (LGA, LGM-R,…)
	Is Visible	To display or hide the Gear Bay
Position (Edges)	Front	Longitudinal position of the front wall
	Inboard	Lateral position of the inboard wall
	Outboard	Lateral position of the outboard wall
	Top	Vertical position of the ceiling
Position / Size	Length	Distance between the front wall and the back wall
V3D - Geometry	Number of Frames	Specifies the number of Frames to define the shape
Weight	Weight	Weight (true value)
Contextual Menu :		
Right click :		
Remove	To remove the selected Gear Bay	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.3.5. Bulkheads

Data relative to all Bulkheads

Properties :		
Bulkhead (Front)	Is Visible	To display or hide the Bulkhead
	Position (X)	Relative position along the longitudinal axis
	Type	List of possible type
	Wall Thickness	Wall thickness
Bulkhead (Rear)	Is Visible	To display or hide the Bulkhead
	Position (X)	Relative position along the longitudinal axis
	Type	List of possible type
	Wall Thickness	Wall thickness
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.4. *Doors*

Data relative to the doors of the fuselage (**specific to Airliners**)

Subitems:	
Passenger Doors	Characteristics of the Passenger Doors
Emergency Exits	Characteristics of the Emergency Exits
Cargo Doors	Characteristics of the Cargo Doors

Properties :		
Configuration	Has Cargo Door	Specifies if it has Cargo Door
	Has Emergency Exit	Specifies if it has Emergency Exit
	Has Passenger Door	Specifies if it has Passenger Door
Contextual Menu :		
Right click :		
Refresh	To compute the geometry of all doors and refresh the 3D-Model	

2.7.1.4.1. Passenger Doors

Data relative to all Passenger Doors

Properties :		
General	Is Visible	To display or hide the geometry
Configuration	Has Identical Doors	Specifies if the doors are identical
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Contextual Menu :		
Right click :		
Add New Passenger Door	To add a new Door	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.4.1.1. #1 – n

Data relative to one Passenger Door

Properties :		
General	Description	Name of the specific Door (Front Right,…)
Dimensions	Area	Door area (true area)
	Maximum Height	Maximum Height
	Maximum Width	Maximum Width
Position	Side	Specifies the side of the body on which it is located
Position (Rl) (1)	X	Position along the longitudinal axis
	Z	Position along the vertical axis
Weight	Weight	Weight (true value)

2.7.1.4.2. Emergency Exits

Data relative to all Emergency Exits

Properties :		
General	Is Visible	To display or hide the geometry
Configuration	Has Identical Doors	Specifies if the doors are identical
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Contextual Menu :		
Right click :		
Add New Emergency Exit	To add a new Door	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.4.2.1. #1 - n

Data relative to one Emergency Exit

Properties :		
General	Description	Name of the specific Door (Front Right,…)
Dimensions	Area	Door area (true area)
	Maximum Height	Maximum Height
	Maximum Width	Maximum Width
Position	Side	Specifies the side of the body on which it is located
Position [(1)]	X	Position along the longitudinal axis
	Z	Position along the vertical axis
Weight	Weight	Weight (true value)

2.7.1.4.3. Cargo Doors

Data relative to all Cargo Doors

Properties :		
General	Is Visible	To display or hide the geometry
Configuration	Has Identical Doors	Specifies if the doors are identical
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Contextual Menu :		
Right click :		
Add New Cargo Door	To add a new Door	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.4.3.1. #1 - n

Data relative to one Cargo Door

Properties :		
General	Description	Name of the specific Door (Front Right,…)
Dimensions	Area	Door area (true area)
	Maximum Height	Maximum Height
	Maximum Width	Maximum Width
Position	Side	Specifies the side of the body on which it is located
Position [(1)]	X	Position along the longitudinal axis
	Z	Position along the vertical axis
Weight	Weight	Weight (true value)

2.7.1.5. *Windows*

Data relative to the windows of the fuselage (**specific to Airliners**)

Subitems:	
Windows	Characteristics of the Windows
Windshield	Characteristics of the Windshield

Properties :		
Configuration	Has Windows	Specifies if it has Windows
	Has Windshield	Specifies if it has Windshield

2.7.1.5.1. Windows

Data relative to all Windows

Properties :		
General	Number of windows	Total number of windows
Dimensions (Unit)	Area	Window area (true area)

2.7.1.6. *Dorsal Fin*

Data relative to the dorsal fin of the fuselage

Properties :		
General	Is Visible	To display or hide the ventral fin
Dimensions	Chord - Root	Root chord
	Chord - Tip	Tip chord
	Span	Span, true distance between root and tip positions
	Thickness - Root	Maximum thickness at the root position
	Thickness - Tip	Maximum thickness at the tip position
Geometry	Sweep @ LE	Sweep @ leading edge
Position	X	Relative position along the longitudinal axis
	Z	Relative position along the vertical axis
Rotation	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis

2.7.1.6.1. 3D Display

Definition of the representation of the ventral fin on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.7.1.7. *Ventral Fin*

Data relative to the ventral fin of the fuselage

Properties :		
General	Has Symmetrical	Specifies that the Fin has its symmetrical about the vertical plane, taken from the fuselage datum
	Is Visible	To display or hide the ventral fin
Dimensions	Chord - Root	Root chord
	Chord - Tip	Tip chord
	Span	Span, true distance between root and tip positions
	Thickness - Root	Maximum thickness at the root position
	Thickness - Tip	Maximum thickness at the tip position
Geometry	Sweep @ LE	Sweep @ leading edge
Position	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis

2.7.1.7.1. 3D Display

Definition of the representation of the ventral fin on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.7.1.8. *Tanks*

Data relative to all tanks of the fuselage

Properties :		
General	Display All	To display or hide all the Tanks
Contextual Menu :		
Right click :		
Add New Tank		To add a new Tank

2.7.1.8.1. **#1 – n**

Data relative to one tank of the fuselage

Properties :		
General	Description	Name of the specific Tank (Center Tank,…)
	Has Restricted Width	Specify if the width is restricted. If not, the width will be limited by the wall of the fuselage
	Is Visible	To display or hide the Tank
Position (Edge)	Bottom	Vertical position of the bottom
	Front	Longitudinal position of the front wall
	Top	Vertical position of the ceiling
	Gap	Gap between tank wall and fuselage wall
Position / Size	Height	Distance between bottom wall and top wall
	Length	Distance between front wall and back wall
V3D - Geometry	Number of Frames	Specifies the number of Frames to define the shape
Contextual Menu :		
Right click :		
Remove	To remove the selected Tank	
Refresh	To compute the geometry and refresh the 3D-Model	

2.7.1.8.1.1. 3D Display

Definition of the representation of the tank on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.7.1.9. *Protuberances*

Data relative to all protuberances of the fuselage

Contextual Menu :	
Right click :	
Add New Canopy	To add new Tank
Add New Belly Container	To add new Belly Container
Add New Engine Cover	To add new Engine Cover
Add New on the back of the Fuselage	To add a new one on the back of the fuselage
Add New on the belly of the Fuselage	To add a new one on the belly of the fuselage
Add New on the sides of the Fuselage	To add a new one on the side of the fuselage
Add New on the Fuselage	To add a new one on the fuselage

2.7.1.9.1. **#1 – n**

Data relative to one protuberance of the fuselage

Properties :		
General	Description	Name of the specific protuberance
	Has Symmetrical	Specify if the body has its symmetrical about the vertical plane, taken from the origin of the airplane
	Is Visible	To display or hide the protuberance
Position (Rl)	X	Relative position along the longitudinal axis (measured from the position of the fuselage)
	Y	Relative position along the lateral axis (measured from the position of the fuselage)
	Z	Relative position along the vertical axis (measured from the position of the fuselage)
Rotation (Rl)	OX	Relative angular position around the X axis (measured from the position of the fuselage)
Weight / CG	CG (X)	Center of Gravity Location (% Length of the Fuselage, measured from fuselage Datum)
	CG (Y)	Center of Gravity Location (% Maximum Width of the Fuselage, measured from fuselage Datum)
	CG (Z)	Center of Gravity Location (% Maximum Height of the Fuselage, measured from fuselage Datum)

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Geometry	To compute the geometry and display the results in the output window

A Protuberance is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.7.1.10. *Anchors*

Data relative to all anchors attached to the fuselage (**specific to Structural Analysis**). An anchor is one node of the meshing on which a concentrated weight may be applied.

Properties :		
Configuration	Display All	To display or hide all the points
Contextual Menu :		
Right click :		
Add New Anchor		To add a new Anchor point

2.7.1.10.1. **#1 – n**

Data relative to one anchor attached to the fuselage

Properties :		
General	Description	Name of the specific Anchor Point (AN1,…)
	Is Visible	To display or hide the current point
Position	Side	Specifies on which side of the body
Position (Rl)	X	Position along the longitudinal axis
	Z	Position along the vertical axis
V3D - Geometry	Radius	Size of the sphere which is used to display the point
Weight	Weight	Concentrated weight @ the point position
Contextual Menu :		
Right click :		
Remove		To remove the selected Anchor Point

2.7.1.11. *Crew Members*

Data relative to all Crew Members

Properties :		
Configuration	Are Visible	To display or hide the Crew Members
Contextual Menu :		
Right click :		
Add New Crew Member		To add a new Crew Member
Compute Minimum Cockpit Size		To compute the size of the box that encompasses the crew members
Compute Relative Position of Crew Members		To compute the relative position of Crew Members from eyes-to-eyes

2.7.1.11.1. Pilot

Data relative to one Crew Member

Properties :		
General	Is Visible	To display or hide the geometry
Measurements	Height	Height of the Crew Member
	Fatness	Fatness. Difference from standard measurements
	Shoulder Breath	Shoulder Breath. Difference from standard measurements
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl)	Lateral	Relative angular position around the lateral axis
	Longitudinal	Relative angular position around the longitudinal axis
	Vertical	Relative angular position around the vertical axis

Contextual Menu :	
Right click :	
Remove	To remove the selected Crew Member
Refresh	To compute the geometry of Crew Member
List Anthropometric Characteristics	To list the Anthropometric Characteristics
Compute Clearance around the Crew Member	To compute the clearance around the Crew Member (minimum distance between one member and the fuselage wall)
Put in Default Sitting Position	To put the Crew Member in the default sitting position
Put in Default Standing Position	To put the Crew Member in the default standing position

2.7.1.11.1.1. Sitting

Data relative to the sitting position of one Crew Member. The movements are limited by biomechanics constraints (NASA, Anthropometry and Biomechanics).

Properties :		
Sitting Position	1 - Neck	Relative angular position around the lateral axis
	2 - Hip	Relative angular position around the lateral axis
	3 - Elbow	Relative angular position around the lateral axis
	4 - Knee	Relative angular position around the lateral axis
	5 - Ankle	Relative angular position around the lateral axis

2.7.1.11.1.1.1. *Body*

Data relative to the position of each member of the Crew Member's body

Properties :		
1 - Head	Lateral	Relative angular position around the lateral axis
	Longitudinal	Relative angular position around the longitudinal axis
	Vertical	Relative angular position around the vertical axis
2 - Neck	Lateral	Relative angular position around the lateral axis
	Longitudinal	Relative angular position around the longitudinal axis
3 - Torso	Lateral	Relative angular position around the lateral axis
	Longitudinal	Relative angular position around the longitudinal axis
	Vertical	Relative angular position around the vertical axis

2.7.1.11.1.1.2. *Arms*

Data relative to the position of each member of the Crew Member's arms

Properties :		
General	Is Symmetrical	Specify if the Sitting Position is symmetrical. Checked implies that the right member and the left member move symmetrically. Unchecked implies that both members can move independently.
L1 - Shoulder	Lateral	Relative angular position around the lateral axis (Left Side)
	Longitudinal	Relative angular position around the longitudinal axis (Left Side)
L2 - Elbow	Lateral	Relative angular position around the lateral axis (Left Side)
	Vertical	Relative angular position around the vertical axis (Left Side)
L3 - Wrist	Lateral	Relative angular position around the lateral axis (Left Side)
	Longitudinal	Relative angular position around the longitudinal axis (Left Side)
	Vertical	Relative angular position around the vertical axis (Left Side)
R1 - Shoulder	Lateral	Relative angular position around the lateral axis (Right Side)
	Longitudinal	Relative angular position around the longitudinal axis (Right Side)
R2 - Elbow	Lateral	Relative angular position around the lateral axis (Right Side)
	Vertical	Relative angular position around the vertical axis (Right Side)
R3 - Wrist	Lateral	Relative angular position around the lateral axis (Right Side)
	Longitudinal	Relative angular position around the longitudinal axis (Right Side)
	Vertical	Relative angular position around the vertical axis (Right Side)

2.7.1.11.1.3. *Legs*

Data relative to the position of each member of the Crew Member's legs

Properties :		
General	Is Symmetrical	Specify if the Sitting Position is symmetrical. Checked implies that the right member and the left member move symmetrically. Unchecked implies that both members can move independently.
L1 - Hip	Lateral	Relative angular position around the lateral axis (Left Side)
	Longitudinal	Relative angular position around the longitudinal axis (Left Side)
	Vertical	Relative angular position around the vertical axis (Left Side)
L2 - Knee	Lateral	Relative angular position around the lateral axis (Left Side)
L3 - Ankle	Lateral	Relative angular position around the lateral axis (Left Side)
	Vertical	Relative angular position around the vertical axis (Left Side)
R1 - Hip	Lateral	Relative angular position around the lateral axis (Right Side)
	Longitudinal	Relative angular position around the longitudinal axis (Right Side)
	Vertical	Relative angular position around the vertical axis (Right Side)
R2 - Knee	Lateral	Relative angular position around the lateral axis (Right Side)
R3 - Ankle	Lateral	Relative angular position around the lateral axis (Right Side)
	Vertical	Relative angular position around the vertical axis (Right Side)

2.7.1.11.1.2. 3D Display

Definition of the representation of the Crew Member on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.7.1.12. *3D Display*

Definition of the representation of the fuselage on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.8. Tailbooms

Data relative to all tailbooms

Properties :		
Processing	Mass Equation	List of weight method prediction
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
Aerodynamics	Transition	Position on the tailboom where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.8.1. #1

Data relative to one tailboom

Subitems :	
Geometry	Geometry of the tailboom
3D Display	

Properties :		
General	Is Visible	To display or hide the fuselage Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Configuration	Has Tank	Specifies if it has Tank
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Weight / CG	CG (X)	Center of gravity location (% Length of the tailboom, measured from tailboom datum)
	CG (Y)	Center of gravity location (% Width of the tailboom, measured from tailboom datum)
	CG (Z)	Center of gravity location (% Height of the tailboom, measured from tailboom datum)
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To update the geometry and refresh the 3D-Model
Update Length	To update the length and refresh the 3D-Model
Compute Geometry	To compute the geometry and display the results in the output window

A Tailboom is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.9. Propulsion

Data relative to the propulsion (all engines)

Properties :		
Processing (Engine)	Mass Equation	List of weight method prediction for the Engine
Processing (Nacelle)	Mass Equation	List of weight method prediction for the Engine-Nacelle
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
Processing (Pylon)	Mass Equation	List of weight method prediction for the Engine-Pylon
	Meshing Accuracy	List of meshing level of accuracy - High : 0.01 m - Mid : 0.05 m - Low : 0.1 m
Fudge Factor	Weight (Engine)	Fudge Factor used to tune the weight prediction for the Engine
	Weight (Nacelle)	Fudge Factor used to tune the weight prediction for the Engine-Nacelle
	Weight (Pylon)	Fudge Factor used to tune the weight prediction for the Engine-Pylon

Contextual Menu :	
Right click :	
Add New Engine (1)	To add a new Engine
Add New Engine (>1)	To add multiple Engines
Check Engine Position	To identify to position of the engine in the airplane
Renumber Engines	To renumber engines, from left to right (from pilot view)
List Engines	To List all engines of the same technology from the engine database

2.9.1. Engine #1

Data relative to one engine

Subitems :	
Engine Envelope	Geometry of the engine envelope
Nacelle	Characteristics of the Nacelle
Pylon	Characteristics of the Pylon
Propellers	Characteristics of the Propeller
Ducted Propeller	Characteristics of the Ducted Propeller

Contextual Menu :	
Right click :	
List Engine Characteristics	To list the characteristics of the engine
Refresh	To reload the engine dataset and refresh the 3D-Model

Properties :		
Description	Model	List of Engines from Engine Database
General	Is Visible	To display or hide the geometry
	Is Critical	The critical engine of a multi-engine aircraft is the one whose failure would result in the most adverse effects on the aircraft's handling and performance
Configuration	Has Nacelle	Specifies if it has a Ducted Propeller
	Has Nacelle	Specifies if it has a Nacelle
	Has Pylon	Specifies if it has a Pylon
	Has spinner	Specifies if it has a Spinner
Engine Technology	Installation Factor	Engine installation Factor, multiplied by engine dry weight to compute the weight of the propulsion. Takes into account engine mount and accessories
	SFC	Engine Specific Fuel Consumption
Position	Mounted on	List of possible location
Position (RI) [(1)]	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis

Thrust Axis	Incidence	Incidence
	Toe-In Angle	Toe-In Angle (+), the thrust axis pointing towards the center-line of the airplane
Weight / CG	CG (X)	Centre of Gravity Location (% Length of the engine)
Contextual Menu :		
Right click :		
Remove	To Remove the current engine	

(1) Use the scroll wheel to increment the furthest right digit

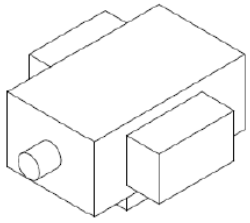
Use the scroll wheel + Crtl button to increment the second furthest right digit

Use the scroll wheel + Shift button to increment the third furthest right digit

Use the scroll wheel + Crtl + Shift button to increment the fourth furthest right digit

2.9.1.1. *Engine Envelope*

The envelope of any engine is made from basic shapes like prisms, cylinders or cones. The shapes are located at a given position from a reference. Additional information about the engine envelope is available in the Technical Note TN02-191



Data relative to the engine envelope

Subitems:	
#C	List of cylinders
#P	List of prisms

Contextual Menu :	
Right click :	
Add New Cylinder to Engine Envelope	To add a new cylinder to the engine envelope
Add New Prism to Engine Envelope	To add a new prism to the engine envelope
	To open a technical note

2.9.1.1.1. #C1 - Cn

Data relative to the geometry of one cylinder

Properties :		
Geometry (Cylinder)	Diameter	Diameter
	Length	Length
Position	Dx	Distance between the reference and the front face of the cylinder (X+)
	Dy	Distance between the reference and the longitudinal axis of the cylinder (Y+)
	Dz	Distance between the reference and the longitudinal axis of the cylinder (Z+)
Contextual Menu :		
Right click :		
Remove		To remove the current cylinder from the engine envelope

2.9.1.1.2. #P1 - Pn

Data relative to the geometry of one prism

Properties :		
Geometry (Cylinder)	Height	Maximum height
	Length	Maximum length
	Width	Maximum Width
Position	Dx	Distance between the reference and the front face of the prism (X+)
	Dy	Distance between the reference and the right lateral face of the prism (Y+)
	Dz	Distance between the reference and the upper face of the prism (Z+)
Contextual Menu :		
Right click :		
Remove		To remove the current prism from the engine envelope

2.9.1.2. *Nacelle*

Data relative to the Engine Nacelle

Subitems :	
Longitudinal Control Lines	Characteristics of the Longitudinal Control Lines
Control Stations	Characteristics of the Control Stations
Anchors	Characteristics of the Anchors points

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Configuration	Has Anchors	Specifies if it has Anchor Points
	Has Protuber-ances	Specifies if it has Protuberances
	Has Tanks	Specifies if it has Tanks
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Weight / CG	CG (X)	Center of Gravity Location (% Length of the Nacelle)
	Weight	Weight (true weight)
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	
Stretch the Body	To stretch the geometry and refresh the 3D-Model	

A Nacelle is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.9.1.3. *Pylon*

Data relative to the Engine Pylon

Properties :		
Position (Rl) [(1)]	Axiswise	In the direction of the axis of the nacelle
	Radialwise	In the direction perpendicular to the axis of the nacelle
Rotation (Rl) [(1)]	OX	Relative angular position around the X axis
Weight	CG (X)	Center of Gravity Location (% MAC)
	Weight	Weight (true weight)

2.9.1.3.1. Sections

Data relative to all sections. The pylon is treated as a lifting surface (all pylons excepted wing-mounted pylon for airliners)

2.9.1.3.1.1. #1 – n

Data relative to one wing section

Properties : Not all Properties : may be visible simultaneously. It depends on the airplane classification and the purpose of the computation (design, performance analysis…).		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (Rl)	Chordwise	Chordwise
	Spanwise	Spanwise

2.9.1.3.2. Geometry

Data relative to the geometry. The pylon is treated as a body (wing-mounted pylon for airliners)

Subitems :	
Longitudinal Control Lines	Characteristics of the Longitudinal Control Lines
Control Stations	Characteristics of the Control Stations
Anchors	Characteristics of the Anchors points

Properties :		
General	Is Visible	To display or hide the geometry
Configuration	Has Anchors	Specified if it has Anchor Points
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Rotation (Rl)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Weight	Weight	Weight (true weight)
Contextual Menu :		
Right click :		
Refresh	To compute the geometry and refresh the 3D-Model	
Stretch the Body	To stretch the geometry and refresh the 3D-Model	

A Pylon is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.9.1.4. *Propellers*

Data relative to all Propellers

Properties :		
Processing	Mass Equation	List of weight method prediction for the Propeller

2.9.1.4.1. **#1 – 2**

Data relative to one Propeller

Properties :		
General	Is Visible	To display or hide the Propeller
	Is Foldable	Specifies that the propeller is foldable
Description	Configuration	Configuration: - Tractor - Pusher
	Type	Type: - Fixed Pitch - Constant Speed
Design Constraints	Sized From	The propeller diameter is imposed by: 1. The maximum allowable propeller diameter 2. The maximum allowable Mach Number
	Max. Diameter	Maximum allowable propeller diameter
	Max. Mach Number	Maximum allowable Mach Number
Dimensions	Diameter	Diameter
Geometry	Is Known (AF, Cli)	Specifies that the propeller blade Activity Factor and the Integrated Design Lift Coefficient are known. If unchecked, the Activity Factor and the Integrated Design Lift Coefficient will be determined to reach the best propeller efficiency
	AF (Blade)	Blade Activity Factor Typical values are between 80 and 200
	Cli	Integrated Design Lift Coefficient Typical values are between 0.35 and 0.60 - Lower values of Cli lead to good high speed performance - Higher values of Cli lead to good low speed performance
	Number of Blades	Number of Blades

Miscellaneous	Blockage Effect	Loss of efficiency due to the presence of a body immediately behind the propeller. The body slows the flow before it reaches the propeller.
	Material	Material - Wood - Composite - Metal
Position (Rl)	X	Relative position along the longitudinal axis
Propeller Hub	Diameter	Relative diameter (% of Propeller Diameter)
	Length	Relative Length (% of Propeller Hub Diameter)
Spinner	Diameter	Relative diameter (% of Propeller Diameter)
	Length	Relative Length (% of Spinner Diameter)
	Shape Parameter	Shape Parameter, between 0 and 1 - 0: Cone - X: Elliptical Shape - 1: Cylinder
Contextual Menu :		
Right click :		
	To open a technical note	

2.9.1.5. *Ducted Propeller*

Data relative to the Ducted Propeller

Properties :		
General	Is Visible	To display or hide the Ducted Propeller
Configuration	Has Stator	Specifies if it has a Stator
Dimensions	Length	Length of the duct
Position (Rl)	X	Relative position along the longitudinal axis
	Z	Relative position along the vertical axis
Propeller Hub	Diameter	Relative diameter (% of Propeller Diameter)
Weight	CG (X)	Center of Gravity Location (% Length of the Duct)
Contextual Menu :		
Right click :		
	To open a technical note	
Refresh	To compute the geometry and refresh the 3D-Model	

2.9.1.5.1. Rotor

Data relative to the rotor

Properties :		
General	Is Visible	To display or hide the Propeller
Description	Configuration	Configuration: - Tractor - Pusher
	Type	Type: - Fixed Pitch - Constant Speed
Geometry	Diameter	Diameter
	Number of Blades	Number of Blades
Miscellaneous	Material	Material - Composite - Metal
Position (Rl)	X	Relative position along the longitudinal axis (measured relative to the duct, % of the duct length)

2.9.1.5.2. 3D Display

Definition of the representation of the fuselage on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency
Shape	Number of CS	Total number of Cross Sections to define the Ring

2.10. Proprotors

Data relative to all proprotors

Properties :		
General	[Total number of iterations]	Total number of iterations if all data are taken into account [READ ONLY]
Has to iterate over	Number of blades	Number of blades
	Rotation Speed	Rotation Speed
	Rotor Blade Root Chord	Rotor Blade Root Chord
	Rotor Blade Taper Ratio	Rotor Blade Taper Ratio
	Rotor Blade Twist	Rotor Blade Twist
	Rotor Diameter	Diameter of the rotor
Number of Blades Rotation Speed Rotor Blade Root Chord Rotor Blade Taper Ratio Rotor Blade Twist Rotor Diameter	Mn	Minimum value
	Mx	Maximum value
	Step	Step value
Contextual Menu :		
Right click :		
Add New Proprotor	To add a new Proprotor	
Check Proprotor Position	To identify to position of the proprotor in the airplane	
List Engines	To List all engines of the same technology from the engine database	
Compute Hover Performance	To compute hover performance out of ground effect	

2.10.1. **#1**

Data relative to one proprotor

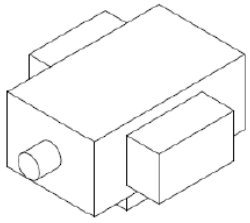
Subitems :	
Engine Envelope	Geometry of the engine envelope
Nacelle	Characteristics of the Nacelle
Rotors	Characteristics of the Rotors

Contextual Menu :	
Right click :	
List Proprotor Characteristics	To list the characteristics of the proprotor
Reload	To reload the engine dataset and refresh the 3D-Model

Properties :		
Description	Model	List of Engines from Engine Database
General	Is Visible	To display or hide the geometry
Configuration	Has Nacelle	Specifies if it has a Ducted Propeller
Position	Mounted on	List of possible location
Position (RI) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Weight / CG	CG (X)	Centre of Gravity Location (% Length of the engine)
Contextual Menu :		
Right click :		
Remove	To Remove the current engine	

2.10.1.1. *Engine Envelope*

The envelope of any engine is made from basic shapes like prisms, cylinders or cones. The shapes are located at a given position from a reference. Additional information about the engine envelope is available in the Technical Note TN02-191



Data relative to the engine envelope

Subitems:	
#C	List of cylinders
#P	List of prisms

Contextual Menu :	
Right click :	
Add New Cylinder to Engine Envelope	To add a new cylinder to the engine envelope
Add New Prism to Engine Envelope	To add a new prism to the engine envelope
	To open a technical note

2.10.1.1.1. #C1 - Cn

Data relative to the geometry of one cylinder

Properties :		
Geometry (Cylinder)	Diameter	Diameter
	Length	Length
Position	Dx	Distance between the reference and the front face of the cylinder (X+)
	Dy	Distance between the reference and the longitudinal axis of the cylinder (Y+)
	Dz	Distance between the reference and the longitudinal axis of the cylinder (Z+)
Contextual Menu :		
Right click :		
Remove		To remove the current cylinder from the engine envelope

2.10.1.1.2. #P1 - Pn

Data relative to the geometry of one prism

Properties :		
Geometry (Cylinder)	Height	Maximum height
	Length	Maximum length
	Width	Maximum Width
Position	Dx	Distance between the reference and the front face of the prism (X+)
	Dy	Distance between the reference and the right lateral face of the prism (Y+)
	Dz	Distance between the reference and the upper face of the prism (Z+)
Contextual Menu :		
Right click :		
Remove		To remove the current prism from the engine envelope

2.10.1.2. *Nacelle*

Data relative to the Proprotor Nacelle

Properties :		
General	Is Visible	To display or hide the geometry
Geometry	Diameter (0)	Front face diameter (located along the longitudinal axis)
	Diameter (1)	Mid-length section diameter (located along the longitudinal axis
	Length	Length
Position (Rl)	Z	Relative position along the vertical axis (measured from the position of the engine)
Weight / CG	CG (X)	Center of Gravity Location (% Length of the Nacelle, measured from nacelle datum)
	CG (Y)	Center of Gravity Location (% Width of the Nacelle, measured from nacelle datum)
	CG (Z)	Center of Gravity Location (% Height of the Nacelle, measured from nacelle datum)
Contextual Menu :		
Right click :		
Compute geometry	To compute the geometry	

2.10.1.3. *Rotors*

Data relative to all Rotors

2.10.1.3.1. **#1 – 2**

Data relative to one Rotor

Properties :		
General	Is Visible	To display or hide the Rotor
	Is Foldable	Specifies that the rotor is foldable
Geometry (Rotor)	Collective Pitch	Pitch angle of the blades measured at the root position of the blade
Geometry (Blade)	Airfoil	Blade airfoil profile
	Radius Offset	Blade radius offset, distance between the center of the rotor and the blade root chord position
Miscellaneous	Material	Material - Wood - Composite - Metal
Position (Rl)	Z	Relative position along the vertical axis
Rotor Hub	Diameter	Relative diameter (% of rotor diameter)
	Length	Relative length (% of rotor hub diameter)
Stopped rotor	Blade angle	Angular position of the blades when stopped - 0°, aligned with the flow - 90°, perpendicular to the flow

2.11. Floats

Data relative to all floats

Properties :		
Aerodynamics	Transition	Position on the tailboom where transition occurs - 0% : Full turbulent (No laminarity) - 100%: Full laminarity
Airframe	Is Composite	Specifies if it is built with Composite
	Is Light Alloy	Specifies if it is built with Light Alloy
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.11.1. #1

Data relative to one float

Subitems :	
Geometry	Geometry of the float
Struts	Geometry of the struts
3D Display	

Properties :		
General	Is Visible	To display or hide the fuselage Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Configuration	Has Struts	Specifies if it has struts
Position (Rl) (1)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Weight / CG	CG (X)	Center of gravity location (% Length of the tailboom, measured from tailboom datum)
	CG (Y)	Center of gravity location (% Width of the tailboom, measured from tailboom datum)
	CG (Z)	Center of gravity location (% Height of the tailboom, measured from tailboom datum)
	Weight	Weight (true weight)

Contextual Menu :	
Right click :	
Refresh	To update the geometry and refresh the 3D-Model

2.11.1.1. *Geometry*

A float is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.11.1.2. *Struts*

Data relative to all Struts of the float

Contextual Menu :	
Right click :	
Add New Strut	To add a new Strut
Refresh	To update the geometry and refresh the 3D-Model

2.11.1.2.1. **#1**

Data relative to one strut

Subitems:	
Sections	Characteristics of the sections of the strut
3D Display	Definition of the representation of the element on the 3D View

Properties :		
General	Is Visible	To display or hide the geometry Note: Select the component and press F2 to manage Transparency and F3 to manage Solid/Wireframe
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis

2.11.1.2.2. Sections

Data relative to all sections of the strut

2.11.1.2.2.1. #1 – 2

Data relative to one section

Properties :		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
List Airfoil Geometric Characteristics		To list the geometric characteristics of the airfoil
List Airfoil Aerodynamic Characteristics		To list the aerodynamic characteristics of the airfoil
Edit Shape		To edit the shape
		To open a technical note

2.11.1.2.2.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.11.1.3. *3D Display*

A float is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.12. Landing gear

Data relative to the landing gear

Subitems :	
Main	Characteristics of the Main Landing Gear
Auxiliary	Characteristics of the Auxiliary Landing Gear

Properties :		
Configuration	Landing gear	List of Configurations - Nosewheel - Tailwheel - Single-wheel
Ground Operation	Tail Down Angle	Tail Down Angle
	Tail Down Ground Clearance	Tail Down Ground Clearance
Contextual Menu :		
Right click :		
	To open a technical note	

2.12.1. Main

Data relative to the main gear

Contextual Menu :	
Right click :	
List Gear Characteristics	To list the characteristics of the main landing gear

Properties :		
Processing	Mass Equation	List of weight method prediction
General	Has Fairing	Has Fairing
	Is Retractable	Specifies if it is Retractable
	Is Retracted	To display the landing gear in the retracted position
	Is Visible	To display or hide the geometry
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Ground Clearance	Fuselage	Distance between the ground and the belly of the fuselage
	Propeller	Distance between the ground and the tip of the propeller blade
Lateral Position	Angle to CG	Minimum angle between 1) the vertical line through the airplane's CG and 2) the line from the airplane's CG and the contact point of the wheel and the ground
	Angle to Wing Tip	Minimum angle between 1) the ground and 2) the line from the wing tip and the contact point of the wheel and the ground
	Track Max.	Maximum Track (% of Wing Span)
	Track Min.	Minimum Track (% of Wing Span)
Longitudinal Position	Angle to CG	Minimum angle between 1) the vertical line through the airplane's CG and 2) the line from the airplane's CG and the contact point of the wheel and the ground

2.12.1.1. *Struts*

Data relative to all struts (Single Strut Configuration)

Contextual Menu :	
Right click :	
Add New Strut	To add a new Strut

2.12.1.1.1. **#1 – 2**

Data relative to one strut

Properties :		
General	Is Retracted	To display the landing gear in the retracted position
Position	Mounted on	List of Strut Positions - Fuselage - Wing
Position (Rl) - Airplane Side	X	Relative position along the longitudinal axis (% of Body Length)
	Y	Relative position along the lateral axis
Position (Rl) – Wheel Side	X	Relative position along the longitudinal axis (measured from airplane's CG position)
	Y	Relative position along the lateral axis (measured from airplane's CG position)
	Z	Relative position along the vertical axis (measured from airplane's CG position)
Rotation amplitude (Strut)	Strut (OX)	Rotation angle around the X Axis
	Strut (OY)	Rotation angle around the Y Axis
Rotation amplitude (Wheel)	Strut (OX)	Rotation angle around the X Axis
	Strut (OZ)	Rotation angle around the Z Axis

Contextual Menu :	
Right click :	
Refresh	To Refresh the geometry and generate the 3D-Model

2.12.1.1.1.1. Wheels

Data relative to all wheels

Contextual Menu :	
Right click :	
Add New Wheel	To add a new Wheel
Refresh	To Refresh the geometry and generate the 3D-Model

2.12.1.1.1.1.1. *#1 - n*

Data relative to one wheel

Properties :		
Configuration	Has Brake	Specifies if it has Brake
Dimensions	Tire	List of tires from tire database
Position (Rl)	X	Relative position along the longitudinal axis (measured from strut-end position)
	Y	Relative position along the lateral axis (measured from strut-end position)
	Z	Relative position along the vertical axis (measured from strut-end position)
Wheel Fairing	Height	Relative Height (% of the Tire Diameter)
	Length	Relative Length (% of the Tire Diameter)
	Width	Relative Width (% of the Tire Width)
	X (Rl)	Relative position along the longitudinal axis (measured from wheel axis)

Contextual Menu :	
Right click :	
List Wheel Characteristics	To List the characteristics of the wheel
Refresh	To Refresh the geometry and generate the 3D-Model
	To Open a technical note

2.12.1.2. *Bogie*

Data relative to all Bogies (Strut & Bogie Configuration, Airliners)

Contextual Menu :	
Right click :	
Add New Bogie	To add a new Bogie

2.12.1.2.1. **#1 - n**

Data relative to one Bogie

Properties :		
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
Remove	To remove the selected Bogie	

2.12.1.2.1.1. Wheels

Data relative to all wheels

Properties :		
Dimensions	Diameter	Outside diameter of the tire
	Width	Width of the tire
Contextual Menu :		
Right click :		
Add New Wheel	To add a new Wheel	

2.12.1.2.1.1.1. *#1 - n*

Data relative to one wheel

Properties :		
Configuration	Has Brake	Specifies if it has Brake
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
Remove	To remove the selected Wheel	
List Wheel Characteristics	To list the characteristics of the wheel	

2.12.2. Auxiliary

Data relative to the auxiliary gear

Contextual Menu :	
Right click :	
List Gear Characteristics	To list the characteristics of the main landing gear

Properties :		
Processing	Mass Equation	List of weight method prediction
General	Has Fairing	Has Fairing
	Is Retractable	Specifies if it is Retractable
	Is Retracted	To display the landing gear in the retracted position
	Is Visible	To display or hide the geometry
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Longitudinal Position	Shifting	Shifting of the auxiliary landing gear along the longitudinal axis (% of the fuselage length)

2.12.2.1. *Struts*

Data relative to all struts (Single Strut Configuration)

2.12.2.1.1. **#1**

Data relative to one strut

Properties :		
General	Is Retracted	To display the landing gear in the retracted position
Position	Mounted on	List of Strut Positions - Fuselage
Position (Rl) - Airplane Side	X	Relative position along the longitudinal axis (% of Body Length)
	Y	Relative position along the lateral axis
Position (Rl) – Wheel Side	X	Relative position along the longitudinal axis (measured from airplane's CG position)
	Z	Relative position along the vertical axis (measured from airplane's CG position)
Rotation amplitude (Strut)	Strut (OX)	Rotation angle around the X Axis
	Strut (OY)	Rotation angle around the Y Axis
Rotation amplitude (Wheel)	Strut (OX)	Rotation angle around the X Axis
	Strut (OZ)	Rotation angle around the Z Axis
Contextual Menu :		
Right click :		
Refresh	To Refresh the geometry and generate the 3D-Model	

2.12.2.1.1.1. Wheels

Data relative to all wheels

Contextual Menu :	
Right click :	
Add New Wheel	To add a new Wheel
Refresh	To Refresh the geometry and generate the 3D-Model

2.12.2.1.1.1.1. *#1 – n*

Data relative to one wheel

Properties :		
Configuration	Has Brake	Specifies if it has Brake
Dimensions	Tire	List of tires from tire database
Position (Rl)	X	Relative position along the longitudinal axis (measured from strut-end position)
	Y	Relative position along the lateral axis (measured from strut-end position)
	Z	Relative position along the vertical axis (measured from strut-end position)
Wheel Fairing	Height	Relative Height (% of the Tire Diameter)
	Length	Relative Length (% of the Tire Diameter)
	Width	Relative Width (% of the Tire Width)
	X (Rl)	Relative position along the longitudinal axis (measured from wheel axis)
Contextual Menu :		
Right click :		
List Wheel Characteristics	To List the characteristics of the wheel	
Refresh	To Refresh the geometry and generate the 3D-Model	
	To Open a technical note	

2.12.2.2. *Bogie*

Data relative to all Bogies (Strut & Bogie Configuration, Airliners)

Contextual Menu :	
Right click :	
Add New Bogie	To add a new Bogie

2.12.2.2.1. **#1**

Data relative to one Bogie

Properties :		
Position	X	Position along the longitudinal axis
	Y	Position along the lateral axis
	Z	Position along the vertical axis
Contextual Menu :		
Right click :		
Remove	To remove the selected Bogie	

2.12.2.2.1.1. Wheels

Data relative to all wheels

Properties :		
Dimensions	Diameter	Outside diameter of the tire
	Width	Width of the tire
Contextual Menu :		
Right click :		
Add New Wheel	To add a new Wheel	

2.12.2.2.1.1.1. *#1 - n*

Data relative to one wheel

Properties :		
Configuration	Has Brake	Specifies if it has a Brake
Position (Rl)	X	Relative position along the longitudinal axis
	Y	Relative position along the lateral axis
	Z	Relative position along the vertical axis
Contextual Menu :		
Right click :		
Remove	To remove the selected Wheel	
List Wheel Characteristics	To list the characteristics of the wheel	

2.13. External Loads

Data relative to all External Loads

Contextual Menu :	
Right click :	
Add New Fuel Tank	To add new Fuel Tank
Add New Pod	To add new Pod
Duplicate External Load	To duplicate an existing External Load

2.13.1. #1 – n

Data relative to one external load

Properties :		
General	Description	Name of the specific external load
	Has Symmetrical	Specify if the body has its symmetrical about the vertical plane, taken from the origin of the airplane
	Is Visible	To display or hide the external load
Configuration	Has Fin	Specifies if it has Fin(s)
	Has Pylon	Specifies if it has a Pylon
Position (Rl)	X	Relative position along the longitudinal axis (measured from the position of the fuselage)
	Y	Relative position along the lateral axis (measured from the position of the fuselage)
	Z	Relative position along the vertical axis (measured from the position of the fuselage)
Rotation (Rl)	OX	Relative angular position around the X axis (measured from the position of the fuselage)
Specifications	PC	Power Consumption
	Weight	Weight of the container ONLY (unit weight) - If fuel tank type, weight of fuel not included - If pod type, weight of electronics not included

Weight / CG	CG (X)	Center of Gravity Location (% Length of the External Load, measured from its Datum)
	CG (Y)	Center of Gravity Location (% Maximum Width of the External Load, measured from its Datum)
	CG (Z)	Center of Gravity Location (% Maximum Height of the External Load, measured from its Datum)

Contextual Menu :	
Right click :	
Remove	To remove the selected Tank
Refresh	To compute the geometry and refresh the 3D-Model
Compute Geometry	To compute the geometry and display the results in the output window

A Protuberance is treated as a Body. Please refer to the paragraph related to the Fuselage to have a full description of the input data.

2.13.1.1. *Pylon*

Data relative to the Pylon

Properties :		
General	Is Visible	To display or hide the Pylon
Position (Rl) (1)	Axiswise	In the direction of the axis of the external load
	Radialwise	In the direction perpendicular to the axis of the external load
Rotation (Rl) (1)	OX	Relative angular position around the X axis

2.13.1.1.1. Sections

Data relative to all sections. The pylon is treated as a lifting

2.13.1.1.1.1. #1 – n

Data relative to one wing section

Properties : Not all Properties : may be visible simultaneously. It depends on the airplane classification and the purpose of the computation (design, performance analysis…).		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (Rl)	Chordwise	Chordwise
	Spanwise	Spanwise

2.13.1.1.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.13.1.2. *Fin*

Data relative to the Pylon

Properties :		
General	Is Visible	To display or hide the Fin
	Number of Fins	Number of Fins
Position (Rl) (1)	Axiswise	In the direction of the axis of the external load
	Radialwise	In the direction perpendicular to the axis of the external load
Rotation (Rl) (1)	OX	Relative angular position around the X axis

2.13.1.2.1. Sections

Data relative to all sections. The pylon is treated as a lifting

2.13.1.2.1.1. #1 – n

Data relative to one wing section

Properties : Not all Properties : may be visible simultaneously. It depends on the airplane classification and the purpose of the computation (design, performance analysis…).		
Airfoil		List of Airfoils from Airfoil Database
Dimensions	Chord	Chord length
Position (Rl)	Chordwise	Chordwise
	Spanwise	Spanwise

2.13.1.2.2. 3D Display

Definition of the representation of the element on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Is Solid	Convert to Solid Model
	Is Wireframe	Convert to Wireframe Model
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

2.14. Systems

Data relative to all systems

Properties :		
Configuration	Has Air Conditioning System	Specifies if it has an Air Conditioning System
	Has Anti Ice System	Specifies if it has an Anti-Ice System
	Has APU	Specifies if it has an Auxiliary Power Unit
	Has Avionics	Specifies if it has Avionics
	Has Brake System	Specifies if it has a Brake System
	Has Control System	Specifies if it has a Control System
	Has Electric System	Specifies if it has an Electric System
	Has Engine Control System	Specifies if it has an Engine Control System
	Has Fuel System	Specifies if it has a Fuel System
	Has Hydraulic System	Specifies if it has an Hydraulic System
	Has Instrument System	Specifies if it has an Instrument System

Contextual Menu :	
Right click :	
Add New System	To add a new System, different than the ones available in the list (whole-airplane parachute for example)

2.14.1. Control

Data relative to the Control System

Subitems :	
Ailerons	Characteristics of the Ailerons
Elevators	Characteristics of the Elevators
Rudders	Characteristics of the Rudders
Spoilers	Characteristics of the Spoilers

Properties :		
Processing	Mass Equation	List of weight method prediction
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.1.1. *Ailerons*

Data relative to the Ailerons

Properties :		
Actuation	Is Mechanical	Specifies if it is a Direct-Linked Control System
	Is Powered	Specifies if it is a Power-Boosted Control System
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.1.1.1. Elevator

Data relative to the Elevator

Properties :		
Actuation	Is Mechanical	Specifies if it is a Direct-Linked Control System
	Is Powered	Specifies if it is a Power-Boosted Control System
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.1.1.2. Rudder

Data relative to the Rudder

Properties :		
Actuation	Is Mechanical	Specifies if it is a Direct-Linked Control System
	Is Powered	Specifies if it is a Power-Boosted Control System
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.1.1.3. Spoiler

Data relative to the Spoilers

Properties :		
Actuation	Is Mechanical	Specifies if it is a Direct-Linked Control System
	Is Powered	Specifies if it is a Power-Boosted Control System
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.1.1.4. Airbrakes

Data relative to the Airbrakes

Properties :		
Actuation	Is Mechanical	Specifies if it is a Direct-Linked Control System
	Is Powered	Specifies if it is a Power-Boosted Control System
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.2. Fuel

Data relative to the Fuel System

Properties :		
Processing	Mass Equation	List of weight method prediction
Capacity (Maximum)	Optional	Maximum additional volume
	Standard	Maximum volume in standard configuration
Unusable Fuel	Drainable	Drainable
	Trapped	Trapped
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.2.1. *Fuel*

Data relative to the Fuel

Properties :		
Fuel	Type	List of fuels from fuel database

2.14.3. Electric System

Data relative to the Electric System

Properties :		
Processing	Mass Equation	List of weight method prediction
Configuration	Has Alternator	Specifies if it has Alternator
	Has Battery	Specifies if it has Battery
	Has Starter	Specifies if it has Starter
Depth of Cycle	Depth of Charge	Percentage of battery capacity that has been charged expressed as percentage of maximum capacity
	Depth of Discharge	Percentage of battery capacity that has been discharged expressed as percentage of maximum capacity
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Power Chain Efficiency	Battery Discharge	Battery discharge
	Motor Controller	Motor controller
	Motor	Motor
	Gearbox	Gearbox
Power Consumption	Avionics	Power consumption of the avionics subsystems
	Payload	Power consumption of the payload
Weight / CG	CG (X)	Centre of Gravity Location (% Length of the Fuselage)
	Weight	Weight (true weight)

2.14.3.1. *Batteries*

Data relative to all batteries (electric propulsion)

Properties :		
Configuration	Has Auxiliary Battery	Specifies if it has Auxiliary Batteries
	Has Main Battery	Specifies if it has Main Batteries

2.14.3.1.1. Main

Data relative to the main battery (electric propulsion)

Contextual Menu :	
Right click :	
List Battery Characteristics	To list the characteristics of the battery
Compute Minimum Weight	To compute the minimum weight of battery to fulfill the power and energy requirements

Properties :		
Battery	Type	List of batteries from battery database
Weight/CG	CG (X)	Center of Gravity Location (% Length of the Fuselage)
	Weight	Weight of battery
	Weight (Minimum)	Weight (Minimum)

2.14.3.1.2. Auxiliary

Data relative to the main battery (electric propulsion)

Properties :		
Battery	Type	List of batteries from battery database
Weight/CG	CG (X)	Center of Gravity Location (% Length of the Fuselage)
	Weight (Minimum)	Weight (Minimum)

2.14.4. Hydraulic System

Data relative to the Hydraulic System

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)

2.14.5. Brake System

Data relative to the Brake System

Properties :		
Configuration	Has Hand Brake	Specifies if it has Hand Brake
	Has Park Brake	Specifies if it has Park Brake
	Has Toe Brake	Specifies if it has Toe Brake
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)

2.14.6. Air Conditioning

Data relative to the Air Conditioning

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)

2.14.7. Anti-Ice System

Data relative to the Anti-Ice System

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)

2.14.8. Instruments

Data relative to the Instruments

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)

2.14.9. Furnishing

Data relative to the Furnishing

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Mass per Occupant	Mass of furnishing per occupant
	Weight	Weight (true weight)

2.14.10. Avionics

Data relative to the Avionics

Properties :		
Processing	Mass Equation	List of weight method prediction
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction
Weight / CG	CG (X)	Center of gravity location (% length of the fuselage)
	Weight	Weight (true weight)
Contextual Menu :		
Right click :		
Compute Mass Uninstalled	To compute the mass of the uninstalled avionics	

2.14.11. Engine Control System

Data relative to the Engine Control System

Properties :		
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.12. APUs

Data relative to the Auxiliary Power Unit (APU)

Properties :		
Processing	Mass Equation	List of weight method prediction
Weight	Weight	Weight (true weight)
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.13. Wing Folding

Data relative to the Wing Folding System

Properties :		
Fudge Factor	Weight	Fudge Factor used to tune the weight prediction

2.14.14. New System

Data relative to an additional system. There is no limit on the maximum number.

Properties :		
General	Description	Name of the new system (Parachute for example)
	Is Visible	To display or hide the current System
Envelope	Shape	Basic shape to represent the system on the 3D Model: - Prism - Cylinder - Cone - Sphere
	Height	Height (distance along the vertical axis)
	Length	Length (distance along the longitudinal axis)
	Width	Width (distance along the lateral axis)
	Diameter	Diameter
	Diameter (0)	Front face diameter (located along the longitudinal axis)
	Diameter (1)	Rear face diameter (located along the longitudinal axis)
Position (Rl)	CG (X)	Center of Gravity Location (% Length of the Fuselage) Center of Gravity Position along the Longitudinal Axis (OX)
	CG (Y)	Center of Gravity Position along the Lateral Axis (OY)
	CG (Z)	Center of Gravity Position along the Vertical Axis (OZ)
Rotation (Rl)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Specifications	Weight	Weight (true weight)
	PC	Power Consumption
	PCE	Power Consumption Efficiency
Contextual Menu :		
Right click :		
Remove	To remove the selected System	

2.15. Weight & Loading

Data relative to the Weight & Loading

Properties :		
Centre of gravity	Batteries	Center of gravity location (% MAC)
	Payload	Center of gravity location (% Length of the Fuselage)
Loading (Maximum)	Fuel	Maximum Fuel
	Payload	Maximum Payload
Loading (Minimum)	Batteries	Minimum Batteries
	Payload	Minimum Payload
Loading (Operating)	[Payload]	Payload [computed value : Flight Weight – Empty Weight – Weight of Fuel – Weight of Batteries]
	Fuel	Fuel weight
	Batteries	Battery weight
Empty Weight	Is Computed from FF	Specifies that the weight fudge factor is given. The empty weight will be computed from the given weight fudge factor and the theoretical empty weight (computed making the sum of the computed weight of each component of the airplane)
	Is given	Specifies that the empty weight is given. The weight fudge factor will be computed from the given empty weight and the theoretical empty weight (computed making the sum of the computed weight of each component of the airplane)
Fudge Factor	Empty Weight	Fudge Factor used to tune the weight prediction Weight' = FF . Weight
Weight	Is Given	To additionally compute the climb performance for a given flight weight, lower than the maximum takeoff weight
	Flight	Flight Weight, which may be lower than the maximum takeoff weight, for which performance will also be computed
	MEW	Manufacturer Empty Weight
	MTOW	Maximum Takeoff Weight
Weight (limitation)	MTW	Maximum Taxi Weight
	MTOW	Maximum Takeoff Weight
	MLW	Maximum Landing Weight

	MZFW	Maximum Zero Fuel Weight
	MFW	Maximum Fuel Weight
CG (Limits)	From Airplane Datum	The CG Limits are given from the Airplane Datum
	From MAC LE	The CG Limits are given from the Leading Edge of the MAC
	Airplane Datum	Relative position of the Airplane Datum measured from the front side of the fuselage
	Mx Forward	Maximum Forward Position (from MAC Leading Edge or from Airplane Datum)
	Mx Rearward	Maximum Rearward Position (from MAC Leading Edge or from Airplane Datum)
CG (Operating)	Airplane CG	Airplane Center of Gravity (% MAC)

Contextual Menu :	
Right click :	
Add New Container	To add a new Container
Compute CG Limits	To compute the CG Limits and display its positions from the airplane datum and from the leading edge of the Mean Aero-dynamic Chord
Compute Weight Breakdown	To compute the weight breakdown
Compute Fudge Factor (Weight)	To compute the weight fudge factor from the given empty weight and the theoretical empty weight
Compute Empty Weight	To compute the empty weight from the given weight fudge factor and the theoretical empty weight

2.15.1. Container

Data relative to a container. There is no limit on the maximum number.

Properties :		
General	Description	Name of the new Container
	Is Visible	To display or hide the current Container
Envelope	Shape	Basic shape to represent the Container on the 3D Model: - Prism - Cylinder - Cone - Sphere
	Height	Height (distance along the vertical axis)
	Length	Length (distance along the longitudinal axis)
	Width	Width (distance along the lateral axis)
	Diameter	Diameter
	Diameter (0)	Front face diameter (located along the longitudinal axis)
	Diameter (1)	Rear face diameter (located along the longitudinal axis)
Position (Rl)	CG (X)	Center of Gravity Location (% Length of the Fuselage) Center of Gravity Position along the Longitudinal Axis (OX)
	CG (Y)	Center of Gravity Position along the Lateral Axis (OY)
	CG (Z)	Center of Gravity Position along the Vertical Axis (OZ)
Rotation (Rl)	OX	Relative angular position around the X axis
	OY	Relative angular position around the Y axis
	OZ	Relative angular position around the Z axis
Specifications	Weight	Weight (true weight)
Contextual Menu :		
Right click :		
Remove	To remove the selected System	
Compute Geometry	To compute the geometry of the container - Length, Width, Height - Volume, Density - Projected area on the floor, Floor loading	

2.16. Performance

Data relative to the performance of the airplane
Flight Conditions are visible according to the Selected Process

Subitems :	
Stall	Performance @ Stall
Cruise	Performance @ Cruise
Takeoff	Performance @ Takeoff
Maximum Rate of Climb	Performance @ Maximum Rate of Climb

Properties :		
Design Parameters	Altitude	Design Flight Altitude
	Mach Number	Design Flight speed
	Weight	Design Flight Weight
Flight Conditions	Best Endurance	To compute the performance for the Best Endurance flight condition
	Best Range	To compute the performance for the Best Range flight condition
	Landing	To compute the performance for Landing
	Maximum Rate of Climb	To compute the performance for the Maximum Rate of Climb flight condition
	Stall	To compute the performance for the stall
	Takeoff	To compute the performance for Takeoff

2.16.1. Stall

Data relative to all Stall flight conditions

Properties :		
General	Flaps Down	Specifies that the “Flaps Down” performance are given
	Flaps Up	Specifies that the “Flaps Up” performance are given
Contextual Menu :		
Right click :		
Add New Stall Performance	To add a new Stall Performance	

2.16.1.1. *#1 - n*

Data relative to one Stall flight condition

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Position	Center of Gravity Location (% MAC)
	Weight	Flight Weight
Performance	Flight Speed	Flight Speed (TAS)
	Max. Lift Coefficient	Maximum Lift Coefficient
Contextual Menu :		
Right click :		
Remove	To remove the selected Stall Performance	

2.16.2. VMn (STOL)

Data relative to the Minimum Speed conditions, specific for STOL aircraft

Contextual Menu :	
Right click :	
Add New Minimum Speed Performance	To add a new Minimum Speed Performance

2.16.2.1. *#1 - n*

Data relative to one Minimum Speed condition

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Position	Center of Gravity Location (% MAC)
	Flap Deflection	List of flaps deflections, from inboard to outboard position, separated by /. The number of values must correspond to the total number of flaps. For STOL airplane with distributed propulsion, the ailerons must be added to the list. E.g. 80 / 70 / 40 / 40
	TED Efficiency	Efficiency of the High Lift Trailing Edge Devices (Flaps and Ailerons) when immersed in the propeller slip-stream (STOL)
	Weight	Flight Weight
Performance	Angle from Stall	Difference between the angle of attack at stall and the angle of attack at minimum flight speed
	Flight Speed	Flight Speed (TAS) – Power On
	Max. Lift Coefficient	Maximum Lift Coefficient
Power Setting	Setting	Percentage of the maximum engine power (measured @SL)
Contextual Menu :		
Right click :		
Remove	To remove the selected Stall Performance	

2.16.3. Cruise

Data relative to all Cruise flight conditions

Contextual Menu :	
Right click :	
Add New Cruise Performance	To add a new Cruise Performance

2.16.3.1. *#1 - n*

Data relative to one Cruise flight condition

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Position	Center of Gravity Location (% MAC)
	Weight	Flight Weight
Performance	Cfe	Equivalent Friction Drag Coefficient
	Flight Speed	Flight Speed (TAS)
	Fuel Flow	Fuel Flow
	Range	Range
Power Extraction	Air Bleed Extraction	Ratio between the air bleed mass flow to the total engine mass flow. Bleed air can be utilized, among other things, for internal cooling of the engine, engine and airframe anti-icing, cabin pressurization, pneumatic actuators, air-driven motors... The bleed mass flow typically ranges from 1-5% of the total engine mass flow
Power Setting	Is Given	The power setting is imposed. If unknow it will be computed from the flight altitude
	Maximum Continuous	Percentage of the maximum engine power (by default 100%). Should be around 20% for a VTOL configuration, and 60% for an aircraft optimized for Best Range or Best Endurance
	Propeller RPM	Propeller RPM @ the given Power Setting
	Setting	Percentage of the maximum engine power (measure @ SL)
	[Power Ratio]	Maximum percentage of the maximum engine power (measured @SL). Depends on flight altitude. For normally aspirated engines, the power ratio decreases with altitude [READ ONLY]

	Best Endurance	To **additionally** compute the performance for the best endurance power setting
	Best Range	To **additionally** compute the performance for the best range power setting
Power Setting – Best Range	Propeller RPM	Propeller RPM @ the Power Setting corresponding to the Best Range flight conditions
	Setting (Mx)	Percentage of the maximum engine power (measure @ SL). This setting will be used if the speed for best range is lower than the stall speed. The power setting for best range is about 55%
Power Setting – Best Endurance	Propeller RPM	Propeller RPM @ the Power Setting corresponding to the Best Endurance flight conditions
	Setting (Mx)	Percentage of the maximum engine power (measure @ SL). This setting will be used if the speed for best endurance is lower than the stall speed. The power setting for best endurance is about 50%
Stopped Engine	Engine #1 - n	Engine #1 (and its symmetric, if any) is stopped during the flight
Transition	Canard Surface	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Engine Nacelle	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Engine Pylon	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Fuselage	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Horizontal Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Vertical Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Wing	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)

Contextual Menu :

Right click :

Remove	To remove the selected Cruise Performance
Compute Stability Derivatives	To compute the stability derivatives

2.16.4. Takeoff

Data relative to all Takeoff flight conditions

2.16.4.1. *#1 - n*

Data relative to one Takeoff flight condition

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Position	Center of Gravity Location (% MAC)
	Flap deflection	Flap deflection
	Throttle Up Time	Time before the throttle is fully open
	Weight	Flight Weight
Power Setting	Maximum from Nominal	Maximum percentage of the NOMINAL power that will be used during takeoff (by default 100%). Can be lower than 100% to reduce the weight of battery if sized for power delivery and not energy storage.
Distance	Takeoff Run	Ground run
	Takeoff to 15m	Takeoff distance to clear the 15m obstacle
Performance	Is IAS	The flight speed is Indicated Air Speed (IAS)
	Is TAS	The flight speed is True Air Speed (TAS)
	Lift Coefficient	Maximum lift coefficient for takeoff setting
	Headwind Speed	Headwind speed
	Liftoff AOA	Angle of Attack required for the given liftoff speed
	Liftoff Speed	Liftoff Speed
	Load Factor	Maximum load factor during transition
	Rotation Speed	Rotation speed
	Rotation Time	Time to rotate to liftoff speed
Power Extraction	Air Bleed Extraction	Ratio between the air bleed mass flow to the total engine mass flow. Bleed air can be utilized, among other things, for internal cooling of the engine, engine and airframe anti-icing, cabin pressurization, pneumatic actuators, air-driven motors... The bleed mass flow typically ranges from 1-5% of the total engine mass flow

Runway	Altitude	Altitude of the runway
	Slope	Slope of the runway
	Surface	Runway surface: - Asphalt - Concrete - Hard Turf - Short Dry Grass - Short Wet Grass - Long Dry Grass - Long Wet Grass - Soft Ground
Water Surface	Altitude	Altitude
	Surface	Surface: - Pure Water - Sea Water
STOL	Climb-out speed	Climb-out speed, minimum speed above the obstacle (% of the liftoff speed, must be > 100%)
	Load Factor	Maximum allowable Load Factor during transition (curved flight path followed by the climb-out to the obstacle)
	TED Efficiency	Efficiency of the High Lift Trailing Edge Devices (Flaps and Ailerons) when immersed in the propeller slipstream

2.16.5. Landing

Data relative to all Landing flight conditions

2.16.5.1. *#1 - n*

Data relative to one Landing flight condition

Properties :		
Description	Mode	Name of the specific Flight Condition
Configuration	Has Brakes ON	Specify if Brakes are applied during Landing
Flight Conditions	Altitude	Flight Altitude
	CG Location	Center of Gravity Location (% MAC)
	Flap deflection	Flap deflection
	Weight	Flight Weight
Distance	Landing from 15m	Landing distance to clear the 15m obstacle
	Landing Run	Ground run
Performance	Free Roll Time	Time before the pilot applies the brakes
	Headwind Speed	Headwind speed
	Load Factor	Maximum load factor during transition
	Touch-Down Speed	Touch-Down speed
Runway	Altitude	Altitude of the runway
	Slope	Slope of the runway
	Surface	Runway surface: - Asphalt - Concrete - Hard Turf - Short Dry Grass - Short Wet Grass - Long Dry Grass - Long Wet Grass - Soft Ground
Water Surface	Altitude	Altitude
	Surface	Surface: - Pure Water - Sea Water

STOL	Approach speed	Approach speed, minimum speed above the obstacle (% of the touchdown speed, must be > 100%)
	Load Factor	Load Factor during Transition
	TED Efficiency	Efficiency of the High Lift Trailing Edge Devices (Flaps and Ailerons) when immersed in the propeller slip-stream

2.16.6. Maximum Rate of Climb

Data relative to the Maximum Rate of Climb flight conditions

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Location	Center of Gravity Location (% MAC)
	Weight	Flight Weight
Power Setting	Maximum from Nominal	Maximum percentage of the NOMINAL power that will be used during takeoff (by default 100%). Can be lower than 100% to reduce the weight of battery if sized for power delivery and not energy storage.
Performance	Climb Speed	To specify the flight speed at the maximum rate of climb. If unknown, the flight speed will be computed from the speed polar
	Flight Speed	Flight Speed (TAS)
	Rate of Climb	Maximum Rate of Climb
Performance (OEI)	Is OEI	To compute with One Engine Inoperative
	Flight Speed	Flight Speed (TAS)
	Rate of Climb	Maximum Rate of Climb (One Engine Inoperative)
Power Extraction	Air Bleed Extraction	Ratio between the air bleed mass flow to the total engine mass flow. Bleed air can be utilized, among other things, for internal cooling of the engine, engine and airframe anti-icing, cabin pressurization, pneumatic actuators, air-driven motors... The bleed mass flow typically ranges from 1-5% of the total engine mass flow
Rate of Climb	Flight Speed	Any speed at which a rate of climb will be computed. This speed must be higher than the stall speed and lower than the maximum level flight speed

2.16.7. Best Range

Data relative to the Best Range flight conditions

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Location	Center of Gravity Location (% MAC)
	Weight	Flight Weight
Performance	Flight Speed	Flight Speed (TAS)
	Range	Maxi Range
Power Extraction	Air Bleed Extraction	Ratio between the air bleed mass flow to the total engine mass flow. Bleed air can be utilized, among other things, for internal cooling of the engine, engine and airframe anti-icing, cabin pressurization, pneumatic actuators, air-driven motors... The bleed mass flow typically ranges from 1-5% of the total engine mass flow
Transition	Canard Surface	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Engine Nacelle	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Engine Pylon	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Fuselage	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Horizontal Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Vertical Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Wing	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)

2.16.8. Best Endurance

Data relative to the Best Endurance flight conditions

Properties :		
Description	Mode	Name of the specific Flight Condition
Flight Conditions	Altitude	Flight Altitude
	CG Location	Center of Gravity Location (% MAC)
	Weight	Flight Weight
Performance	Flight Speed	Flight Speed (TAS)
	Endurance	Maxi Endurance
Power Extraction	Air Bleed Extraction	Ratio between the air bleed mass flow to the total engine mass flow. Bleed air can be utilized, among other things, for internal cooling of the engine, engine and airframe anti-icing, cabin pressurization, pneumatic actuators, air-driven motors... The bleed mass flow typically ranges from 1-5% of the total engine mass flow
Transition	Canard Surface	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Engine Nacelle	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Engine Pylon	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Fuselage	Position along the body where transition occurs (Laminar flow to Turbulent flow)
	Horizontal Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Vertical Tail	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)
	Wing	Position along the chord of the lifting surface where transition occurs (Laminar flow to Turbulent flow)

2.17. Missions

Data relative to all Missions

Contextual Menu :	
Right click :	
Add New Mission (Simple)	To add a new Mission (5 Segments)

2.17.1. #S 1

Data relative to one Mission

Subitems :	
Takeoff	Characteristics during the Takeoff segment
Climb	Characteristics during the Climb segment
Cruise	Characteristics during the Cruise segment
Descent	Characteristics during the Descent segment
Landing	Characteristics during the Landing segment

Properties :		
General	Description	Name of the specific Mission (ICAO Departure Airport Code - ICAO Arrival Airport Code)
Operational Empty Weight	OEW	Operational Empty Weight
Center of Gravity	Airplane	Airplane Center of Gravity Location @ the beginning of the mission (% MAC)
Fuel	CG Position	Fuel Center of Gravity Location @ the beginning of the mission (% MAC)
	Fuel	Fuel Weight
Payload	CG Position	Payload Center of Gravity Location @ the beginning of the mission (% MAC)
	Payload	Payload

Contextual Menu :	
Right click :	
Remove	To remove the selected Mission
Duplicate	To duplicate the selected Mission

2.17.1.1. *01 Takeoff*

Data relative to the Takeoff segment

Properties :		
Mode	HLD Setting	List of High Lift Device Settings
	LG Setting	List of Landing Gear Settings
	Thrust Mode	List of Thrust Mode
Condition 0	Altitude	Altitude @ the beginning of the current segment
	Speed	Speed @ the beginning of the current segment
Condition 1	Altitude	Altitude @ the end of the current segment
Other	Headwind Speed	Headwind Speed
Processing	Number of Segments	Number of sub-segments to consider in the current segment

2.17.1.2. *02 Climb*

Data relative to the Climb segment

Properties :		
Mode	HLD Setting	List of High Lift Device Settings
	LG Setting	List of Landing Gear Settings
	Speed Mode	List of Speed Mode
	Thrust Mode	List of Thrust Mode
Condition 0	Speed	Speed @ the beginning of the current segment
Condition 1	Altitude	Altitude @ the end of the current segment
Other	Headwind Speed	Headwind Speed
Processing	Number of Segments	Number of sub-segments to consider in the current segment

2.17.1.3. *03 Cruise*

Data relative to the Cruise segment

Properties :		
Mode	HLD Setting	List of High Lift Device Settings
	LG Setting	List of Landing Gear Settings
	Speed Mode	List of Speed Mode
	Thrust Mode	List of Thrust Mode
Condition	Range	Range
Condition 0	Speed	Speed @ the beginning of the current segment
Other	Headwind Speed	Headwind Speed
Processing	Number of Segments	Number of sub-segments to consider in the current segment

2.17.1.4. *04 Descent*

Data relative to the Descent segment

Properties :		
Mode	HLD Setting	List of High Lift Device Settings
	LG Setting	List of Landing Gear Settings
	Speed Mode	List of Speed Mode
	Thrust Mode	List of Thrust Mode
Condition 0	Speed	Speed @ the beginning of the current segment
Condition 1	Altitude	Altitude @ the end of the current segment
Other	Headwind Speed	Headwind Speed
Processing	Number of Segments	Number of sub-segments to consider in the current segment

2.17.1.5. *05 Landing*

Data relative to the Landing segment

Properties :		
Mode	HLD Setting	List of High Lift Device Settings
	LG Setting	List of Landing Gear Settings
	Thrust Mode	List of Thrust Mode
Condition 0	Speed	Speed @ the beginning of the current segment
Condition 1	Altitude	Altitude @ the end of the current segment
Other	Headwind Speed	Headwind Speed
Processing	Number of Segments	Number of sub-segments to consider in the current segment

2.18. Cost

Properties :		
General	Is Known	Specifies that the market price is known
	Inflation rate	Yearly Mean Inflation Rate between Today and the Year of Reference
Pricing	Price	List Price
	Year of Reference	Year of Reference

2.19. Processing

Data relative to Processing and Computing Options

Subitems :	
Aerodynamics	Characteristics about Aerodynamics
Centre of gravity	Characteristics about Centre of gravity
Design Constraints	Characteristics about Design Constraints
Cost	Characteristics about Cost
Fudge Factor	Characteristics about Fudge Factor
Dynamic Stability	Characteristics about Dynamic Stability
Drag Table	Characteristics about Drag Table
Cruise Table	Characteristics about Cruise Table
Meshing	Characteristics about Meshing
Export	Selection of the Output File Format
Advanced	Characteristics about Advanced Parameters

Properties :		
Is Computed For	Computed For	List of authorized processes, function of the user's license - Reverse Engineering - Design Level 1 - Design Level 2 - Performance Analysis - Dynamic Stability
	Optimized for	Optimized for: - Maximum Cruise Speed - Best Range - Best Endurance
	Mission	List of Missions
	Is Multiple	Multiple runs will be made successively according to input data. A summary of the results will be presented in tabular form in the output window
	Is Single	A single run will be made according to input data. All the results will be displayed in the Airplane Report document

Performance Analysis	Takeoff	To Compute takeoff performance
	Climb	To compute Climb performance
	Level Flight	To compute Level Flight performance
	Descent	To compute Descent performance
	Landing	To compute Landing performance
	Speed Polar	To compute the Speed Polar
Checks	Track changes	To track changes caused by modification of input data. Only modified values will be displayed
	Track changes (all)	To track changes caused by modification of input data. All values will be displayed
Compute	Cruise Table	To generate the Cruise Table
	Drag Table	To generate the Drag Table
	Mission Table	To generate the Mission Table
	Payload Chart	To generate the Payload Chart
	SAR Chart	To generate the Specific Air Range Chart
Checks	CG Range	Check the center of gravity for all load cases (must be between the limits)
	Interference with Crew Members	Check for interference between crew members and fuselage
	Track changes	Track changes caused by modification of input data. Only modified values will be displayed
	Track changes (all)	Track changes caused by modification of input data. All values will be displayed
Cost Analysis	Manufacturing	To Compute Manufacturing cost
	Market Price	To Compute Market Price
	Operating	To compute Operating Cost
	RDTE	To compute Research, Development, Test and Evaluation Cost

Mass Equation	Fuselage	List of weight method prediction
	Horizontal Tail	List of weight method prediction
	Landing Gear	List of weight method prediction (Main & Auxiliary)
	Propulsion	List of weight method prediction (Engine & Nacelle & Pylon & Propeller)
	Systems	List of weight method prediction (All systems)
	Nacelle	List of weight method prediction
	Vertical Tail	List of weight method prediction
	Wing	List of weight method prediction
Standard Geometry	Horizontal Tail	List of standard geometry definition Cf.TN02-051 – Standard Geometry
	Vertical Tail	List of standard geometry definition Cf.TN02-051 – Standard Geometry
	V-Tail	List of standard geometry definition Cf.TN02-051 – Standard Geometry
	Wing	List of standard geometry definition Cf.TN02-051 – Standard Geometry

2.19.1. Aerodynamics

Options relative to the computation aerodynamics

Subitems :	
Airfoil Candidates	Airfoil candidates
Lift Distribution	Lift Distribution

Properties :		
Is Computed from	Cd0	Specifies that the Zero Lift Drag is computed from Zero Lift Drag Coefficient
	CdInt	Specifies that the Zero Lift Drag is computed from Interference Drag Coefficient
	Cfe	Specifies that the Zero Lift Drag is computed from Equivalent Friction Drag Coefficient
If is computed from Cd0 :		
Zero Lift Drag Coefficient	Cd0	Zero Lift Drag Coefficient
	Altitude	Reference altitude
	Mach Number	Reference flight speed (Mach Number)
If is computed from Cdint :		
Misc & Interference Drag Coefficient	Cdint	Relative Interference Drag Coefficient
	Miscellaneous	Drag coefficient of all miscellaneous items, such as antennas, pods, any protrusions…
If is computed from Cfe :		
Equivalent Friction Coefficient	Cfe	Equivalent Friction Drag Coefficient
	Altitude	Reference altitude
	Mach Number	Reference flight speed (Mach Number)

2.19.1.1. *Airfoil Candidates*

Airfoil Candidates are airfoils selected to be the most suitable for a given lifting surface and for a given flight condition. The selection is made according to geometric and aerodynamic criteria.

Subitems :	
Canard Surface	Selection criteria for the Canard Surface
Horizontal Tail	Selection criteria for the Horizontal Tail
Wing	Selection criteria for the Wing

Properties :		
Has to List Airfoil Candidates	Canard Surface	Has to list airfoil candidates for canard surface at the end of computation
	Horizontal Tail	Has to list airfoil candidates for horizontal tail at the end of computation
	Wing	Has to list airfoil candidates for wing at the end of computation

Contextual Menu :	
Right click :	
Generate Airfoil List	To generate the list of airfoils from the Airfoil Database
Update Airfoil List	To update the list of airfoils from the Airfoil Database

2.19.1.1.1. Canard Surface/Horizontal Tail/Wing

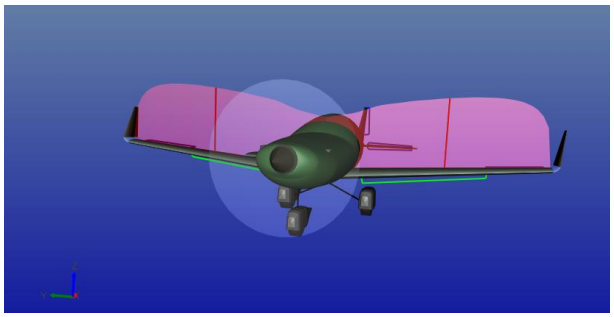
The airfoil database contains over 1300 airfoils. Each airfoil has been developed for a given purpose. Airfoils developed for similar purposes are grouped in the same family.

Properties :		
Selection among	Canard Surface	Selection among Canard-Surface airfoil family
	Conventional Airplane	Selection among Conventional-Airplane airfoil family
	Flying Wing	Selection among Flying-Wing airfoil family
	Human Power	Selection among Human-Power airfoil family
	Low Reynolds Number	Selection among Low-Reynolds-Number airfoil family
	Other	Selection among Other airfoil family
	Sailplane	Selection among Sailplane airfoil family
	Sailplane (RC)	Selection among Radio-Controlled-Sailplane airfoil family
	Tailless	Selection among Tailless airfoil family
	Winglet	Selection among Winglet airfoil family
Selection on	Mx Camber	Selection made on **geometric criteria** (maximum camber). Airfoils of a given family will be selected if its maximum camber is within given limits
	Mx Lift Coefficient	Selection made on **aerodynamic criteria** (maximum lift coefficient). Airfoils of a given family will be selected if its maximum lift coefficient is higher than a given limit
	Mx Relative Thickness	Selection made on **geometric criteria** (maximum relative thickness). Airfoils of a given family will be selected if its maximum relative thickness is within given limits
Sorting Option	Sorting Option	Selected profiles will be displayed according to sorting options, **aerodynamic criteria**, in ascending or descending order: - Maximum Lift Coefficient - Zero Angle of Attack Pitching Moment - Minimum Drag Coefficient - Glide Ratio at Design Lift Coefficient - Maximum Glide Ratio - Zero Lift Angle of Attack

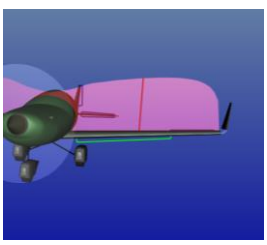
Flight Conditions	Is Given	The flight conditions are imposed. If unknown, they will be taken from the main-flight-conditions. This implies to make a first run before in order to initialize the Design-Lift-Coefficient and the Design-Reynolds-Number
	Cl	Design Lift Coefficient
	RN	Design Reynolds Number
Camber	Mn	Lower value
	Mx	Upper value
Mx Lift Coeffi-cient	Mn	Lower value
Mx Relative Thickness	Mn	Lower value
	Mx	Upper value
Output	All	Specifies that all the candidates will be displayed in the output window
	Top 05	Specifies that only the top 5 candidates will be displayed in the output window
	Top 10	Specifies that only the top 10 candidates will be displayed in the output window
	Top 20	Specifies that only the top 20 candidates will be displayed in the output window
Contextual Menu :		
Right click :		
List Airfoil Candidates	To generate the list of airfoil candidates and display the list in the output window	

2.19.1.2. *Lift Distribution*

Options relative to the computation of the lift distribution



Properties :		
General	Cl	To compute and display the distribution of lift coefficient along the span
	ClMx	To compute and display the distribution of maximum lift coefficient along the span
	Cl . Chord	To compute and display the distribution of linear lift coefficient along the span
	Induced Angle	To compute and display the distribution of induced angle along the span
Flight Conditions	Mass	Flight Mass. Is used to compute the load factor
	Altitude	Flight Altitude. Is used to compute the Reynolds Number and the air density
	Speed	Flight Speed (TAS). Is used to compute the Reynolds Number and the lift force
	AOA	Airplane Angle of Attack
	CS Deflection	Control Surface Deflection
	HLTED Deflection	High Lift Trailing Edge Device Deflection



The red line represents the position where the lift coefficient is maximum. In other words, the location where the stall will start. It is important to locate this line out of the control surface location.

Contextual Menu :	
Right click :	
Refresh	To compute the lift distribution and refresh the 3D-Model
List Lift Distribution	To list aerodynamic data at different stations along the span, from the left side (-) to the right side (+) : Y Position along the span ClMx Maximum lift coefficient (local) Cl Lift coefficient (local) Clc Linear lift coefficient (Cl.Chord) Clr Relative lift coefficient (local/global) Alphai Induced angle
Export CSV	To save the data in a csv file. The file name is generated according to the flight conditions and is the concatenation of : Mass 900 kg Altitude SL (0 m) Speed 200 km/h AOA 3° Control Surface Deflection 0° High Lift Device Deflection 0° For example: TLD-0900-0000-200-030-000-000.csv

2.19.1.2.1. 3D Display

Definition of the representation of the lift distribution on the 3D View

Properties :		
Color	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
Display	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency
	Scale Factor	Specifies the Scale Factor of the Current 3D Model (from 0.1 to …)

2.19.2. Center of gravity

Options relative to the position of the center of gravity

Properties :		
Forward Position	@ Stall (Flaps Up)	To compute the maximum forward position of the center of gravity taking into account the stall (flaps up) flight condition
	@ Stall (Flaps Down)	To compute the maximum forward position of the center of gravity taking into account the stall (flaps down) flight condition
	@ Takeoff Rotation	To compute the maximum forward position of the center of gravity taking into account the takeoff rotation flight condition
	@ Landing flareout	To compute the maximum forward position of the center of gravity taking into account the landing flareout flight condition
Position	Static Margin	Distance between the center of gravity and the neutral point of the aircraft, expressed as a percentage of the mean aerodynamic chord of the wing
Contextual Menu :		
Right click :		
	To open a technical note	

2.19.3. Design Constraints

Data relative to all Design Constraints

Properties :		
Airworthiness Requirements	Has to comply with Regulation	To check some results if they comply with the selected regulation
Contextual Menu :		
Right click :		
Add New Design Constraint	To add a new Design Constraint	
	To open a technical note	

2.19.3.1. *#1 – n*

Data relative to one Design Constraint

Properties :		
Design Constraint	Constraint	Constraint: - Wing Area - Wing Span - Wing Chord - Horizontal Tail Area - Horizontal Tail Span - Horizontal Tail Chord - Length Overall - Height Overall - Width Overall - Maximum Takeoff Weight
	Has Lower Limit	Has to constraint to a minimum value
	Has Upper Limit	Has to constraint to a maximum value
	Max.	Maximum Value
	Min.	Minimum Value

2.19.4. Cost

Data relative to the cost.

Properties :		
General	Inflation rate	Yearly Mean Inflation Rate between Today and 2019
Cost Equation	Operating	List of Operating Cost method prediction
	RDTE & Manufacturing	List of Research, Development, Test, Evaluation and Manufacturing Cost method prediction
Pricing	Battery	Battery Price-to-Energy Ratio
	Electric Motor	Electric Motor Price-to-Power Ratio

2.19.4.1. *RDTE & Manufacturing*

Data relative to the Research, Development, Test, Evaluation and Manufacturing Costs

Properties :		
General	FTA Quantity	Number of flight test aircraft
	Production Quantity	Total number of airplanes for production
	Profit	Overall profit on RDTE + Flyaway cost
Costs	Avionics	Avionics cost per airplane
	Interior Cost	Interior cost per passenger
Fudge Factor	Is General	To use the same fudge factor everywhere
	General	General fudge factor for computed prices and labor manhours
	Development-support	Fudge factor on nonrecurring Development-support costs. Development-support costs cover all nonrecurring manufacturing costs including mockups, structural test articles
	Engineering Hours	Fudge factor for engineering manhours
	Flight-tests	Fudge factor on nonrecurring flight-tests costs. Flight-tests costs cover all costs incurred to demonstrate airworthiness for certification
	Manufacturing Hours	Fudge factor for manufacturing manhours
	Materials	Fudge factor for manufacturing Materials. Manufacturing materials include the structural raw material and aircraft systems such as the electric, hydraulic, pneumatic systems and standard parts

	Tooling Hours	Fudge factor for tooling manhours
Fudge Factor - Materials	Materials	Fudge factor to be applied on the hours estimate to take into account the difficulty of design and fabrication
Labor Rates	Engineering	Engineering labor rate
	Manufacturing	Manufacturing labor rate
	Quality Control	Quality Control labor rate
	Quality Control Factor	Quality Control time as a fraction of manufacturing time
	Tooling	Tooling labor rate

Contextual Menu :

Right click :

Compute Cost (RDTE & Manufacturing)	To compute the cost and display the results in the output window
	To open a technical note

2.19.4.2. *Market Price*

Data relative to the Market Price

Contextual Menu :	
Right click :	
Compute Cost (Market Price)	To compute the cost and display the results in the output window
	To open a technical note

2.19.4.3. *Operating*

Data relative to the Operating Costs

Properties :		
General	Base Value	Base value
	Flight Hours	Number of flight hours per year
	Service years	Total service years for airplane
Crew	Cabin Crew Rate	Rate of one cabin crew member
	FD Crew Rate	Rate of one flight deck crew member
	Number of Cabin Crew	Number of crew members in the cabin
	Number of FD Crew	Number of crew members in the flight deck
Finance	Borrowed Capital	Borrowed capital for aircraft ownership as a percentage of total value
	Interest Rate	Interest rate
	Loan Period	Loan period
	Revenue Rate	Rate of revenue for invested capital
Fuel	Cost	Fuel cost per liter
Grid Electricity	Cost	Electricity cost per kWh
Maintenance	Adjustment Factor	Maintenance cost adjustment factor
	Hourly Rate	Maintenance labor rate
	Maintenance Hours	Number of maintenance hours needed for one hour of flight
	Engine Overhaul	Provision for engine overhaul as a percentage of aircraft base value

Miscellaneous	Airport Operations	Hourly cost of airport operation
	Amortization Period	Amortization period
	Insurance Factor	Annual insurance factor (% of airplane base value)
	Miscellaneous Fixed	Additional fixed costs
	Miscellaneous Variable	Additional variable costs
	Residual Value	Residual value of the airplane at the end of the service as a percentage of the base value
	Storage Factor	Storage cost per year (% of aircraft base value)
Rental Costs	Is rented	Specifies if it is operated in rental
	Rental Cost	Yearly rental cost for rented airplane

Contextual Menu :

Right click :

Compute Cost (Operating)	To compute the cost and display the results in the output window
	To open a technical note

2.19.5. Fudge Factors

Data relative to the Fudge Factors. Fudge Factors are used to tune the equations at different stage of the computing process.

Properties :		
Airfoil…	Canard	Fudge Factor used to tune the prediction of the Canard Surface Airfoil Maximum Lift Coefficient. (Cl_{Mx}' = FF . Cl_{Mx})
	Horizontal Tail	Fudge Factor used to tune the prediction of the Horizontal Tail Airfoil Maximum Lift Coefficient. (Cl_{Mx}' = FF . Cl_{Mx})
	Wing	Fudge Factor used to tune the prediction of the Wing Airfoil Maximum Lift Coefficient. (Cl_{Mx}' = FF . Cl_{Mx})
Drag	Is General	To use the same factor everywhere
	D_0	Fudge Factor used to tune the Zero Lift Drag prediction (D_0' = FF . D_0)
	D_{0w}	Fudge Factor used to tune the Zero Lift Wave Drag prediction (D_{0w}' = FF . D_{0w})
	D_L	Fudge Factor used to tune the Induced Drag prediction (D_L' = FF . D_L)
	D_{Lw}	Fudge Factor used to tune the Induced Wave Drag prediction (D_{Lw}' = FF . D_{Lw})
	D_{Trim}	Fudge Factor used to tune the Trim Drag prediction (D_T' = FF . D_T)
Ducted Propeller Thrust	C0	Constant C0 of the quadratic equation Thrust ' = Thrust . ($C2.V^2 + C1.V + C0$)
	C1	Constant C1 of the quadratic equation Thrust ' = Thrust . ($C2.V^2 + C1.V + C0$)
	C2	Constant C2 of the quadratic equation Thrust ' = Thrust . ($C2.V^2 + C1.V + C0$)

Lift Slope – Lift Distribution	Is Default	Specifies that the fudge factor used to tune the lift slope at the position of bodies on the wing will be computed from the size and position of every bodies on the wing
	a0 (Engine Nacelle)	Fudge Factor used to tune the lift slope at the position of the engine nacelle a0' = FF . a0
	a0 (Fuse-lage)	Fudge Factor used to tune the lift slope at the position of the fuselage a0' = FF . a0
	a0 (Tail-boom)	Fudge Factor used to tune the lift slope at the position of the tailboom a0' = FF . a0
Lift Slope – Wing-Body	Is Default	Specifies that the fudge factor used to tune the wing-body lift slope will be computed from the wing-fuselage interference factor, and the wing upwash gradient to take into account the nacelles, if any
	a0 (Wing-Body)	Fudge Factor used to tune the wing-body lift slope to take into account the presence of bodies (fuselage, nacelles, tailbooms…) on the wing or near the wing a0' = FF . a0
Propeller Effi-ciency	Best Endur-ance	Fudge Factor used to tune the Propeller Efficiency prediction for the Best Endurance Setting (for Polynomial Equation ONLY) Rh' = FF . Rh
	Best Range	Fudge Factor used to tune the Propeller Efficiency prediction for the Best Range Setting (for Polynomial Equation ONLY) Rh' = FF . Rh
	Climb	Fudge Factor used to tune the Propeller Efficiency prediction in Climb (for Polynomial Equation ONLY) Rh' = FF . Rh
	Cruise	Fudge Factor used to tune the Propeller Efficiency prediction in Cruise (for Polynomial Equation ONLY) Rh' = FF . Rh
	Maximum Rate of Climb	Fudge Factor used to tune the Propeller Efficiency prediction for the Maximum Rate of Climb Setting (for Polynomial Equation ONLY) Rh' = FF . Rh
	Takeoff	Fudge Factor used to tune the Propeller Efficiency prediction for Takeoff (for Polynomial Equation ONLY) Rh' = FF . Rh

Rp	Is General	To use the same factor everywhere
	Rp	Fudge Factor used to tune the Power Ratio prediction (Rp' = FF . Rp)
SFC	Is General	To use the same factor everywhere
	SFC	Fudge Factor used to tune the Specific Fuel Consumption prediction (SFC' = FF . SFC)
Weight	Is General	To use the same factor everywhere If checked, specific fudge factors are not displayed on the TreeView
	Weight	Fudge Factor used to tune the weight prediction (Weight' = FF . Weight)

2.19.6. Multiple Runs

Definition of multiple runs.

Subitems:	
Input	Selection of input to modify during the multiple run
Output	Selection of results to display at the end of the multiple run
Limits	Selection of limits to automatically filter the results

2.19.6.1. *Input*

Selection of input to modify during the multiple run.

Properties :		
Aerodynamics	Cdint	Relative interference drag coefficient
	Miscellaneous	Drag coefficient of all miscellaneous items such as antennas, pods, any protrusions…
Center of gravity	CG	Airplane center of gravity (% MAC)
Flight Weight	Flight Weight	Flight weight (same amount of fuel)
Fudge Factor	Mass	Fudge Factor used to tune the weight prediction
Fuel	Fuel	Fuel weight
Geometry (tails)	Aspect ratio	Aspect Ratio
	Sweep @ LE	Sweep @ Leading Edge
	Tail Area / Wing Area	Area projected on the reference plane / Wing Area
	Taper ratio	Taper Ratio
	Volume Coefficient	Tail Volume Coefficient
Geometry (Wing)	Aspect ratio	Aspect Ratio
	Sweep @ LE	Sweep @ Leading Edge
	Taper ratio	Taper Ratio
Mass Ratio	Glider/MTOW	Glider weight / Maximum takeoff weight
Payload	Payload	Maximum Payload (Maximum Zero Fuel Weight – Empty Weight)
Performance (Best Rate of Climb)	Altitude	Altitude @ best rate of climb
Performance (Cruise)	Altitude	Cruise altitude

	Range	Range @ cruise setting
Performance (Best Endurance)	Altitude	Altitude @ best endurance setting
	Endurance	Endurance @ best endurance setting
	Speed	Speed @ best endurance setting (TAS)
Performance (Best Range)	Altitude	Altitude @ best range setting
	Range	Range @ best range setting
	Speed	Speed @ best range setting (TAS)
Performance (Stall)	Altitude	Altitude @ stall
Performance (Takeoff)	Altitude	Altitude @ takeoff
	Rotation Time	Time to rotate to liftoff attitude
Performance (Landing)	Altitude	Altitude @ landing
	Free Roll Time	Time before the pilot applies the brakes
Performance (Target)	Cruise - Cfe	Friction coefficient @ cruise setting
	Cruise - Range	Range @ cruise setting
	Cruise - Speed	Speed @ cruise setting (TAS)
	Best Endurance - Cfe	Friction coefficient @ best endurance setting
	Best Endurance - Endurance	Range @ best endurance setting
	Best Endurance - Speed	Speed @ best endurance setting (TAS)
	Best Range - Cfe	Friction coefficient @ best range setting
	Best Range - Range	Range @ best range setting
	Best Range - Speed	Speed @ best range setting (TAS)
	Mx Rate of Climb	Maximum rate of climb
	Stall – Mx lift coefficient	Maximum lift coefficient
	Stall – Speed	Stall speed (TAS)
	Takeoff Run	Ground run

Propeller	AF (Blade)	Blade Activity Factor
	Cli	Integrated design lift coefficient
	Mx Mach Number	Maximum Mach number
	Pitch Angle	Pitch angle
Stability	Static Margin	Static margin

2.19.6.1.1. #1 – n

Data relative to one input

Properties :		
General	[Lower Limit]	Lowest value allowed [Read ONLY]
	[Upper Limit]	Highest value allowed [Read ONLY]
	[Number of runs]	Number of runs if only this data is taken into account [Read ONLY]
	[Total number of runs]	Total number of combination of runs if all data are taken into account [Read ONLY]
Input Data	Mn	Lowest value of the list
	Mx	Highest value of the list
	Step	Gap between values in the list

2.19.6.2. *Output*

Selection of results to display at the end of the multiple run. The results will be presented in tabular form in the output window

Properties :		
Costs	Manufacturing	Manufacturing costs
	Operating	Operating costs
	RDTE	Research, Development, Tests and Evaluation Costs
Engine	MxBHP	Engine power (total)
Geometry (Tails)	Area	Tail area
	Aspect Ratio	Tail aspect ratio
Geometry (Wing)	Area	Wing area
	Aspect Ratio	Wing aspect ratio
Performance (Best Endurance)	Cd	Drag coefficient @ best endurance setting
	Cl	Lift coefficient @ best endurance setting
	Endurance	Endurance @ best endurance setting
	Fuel Consumption	Fuel consumption @ best endurance setting
	Propeller Efficiency	Propeller efficiency @ best endurance setting
Performance (Best Range)	Cd	Drag coefficient @ best range setting
	Cl	Lift coefficient @ best range setting
	Endurance	Endurance @ best range setting
	Fuel Consumption	Fuel consumption @ best range setting
	Propeller Efficiency	Propeller efficiency @ best range setting
Performance (Best Rate of Climb)	Rate of Climb	Rate of climb @ best rate of climb setting

Performance (Cruise)	Cd	Drag coefficient @ cruise setting
	Cl	Lift coefficient @ cruise setting
	Endurance	Endurance @ cruise setting
	Fuel Consumption	Fuel consumption @ cruise setting
	Propeller Efficiency	Propeller efficiency @ cruise setting
	Range	Range @ cruise setting
	Speed	Speed @ cruise setting
Performance (Stall)	Speed	Stall speed
Performance (Take-off)	Takeoff run	Takeoff run
Weight & Loading	EW	Empty weight
	Fuel	Maximum weight of fuel
	MTOW	Maximum takeoff weight

2.19.6.3. *Limits*

Selection of limits to automatically filter the results. Only the results that are between the limits will be displayed in the output window.

Properties :		
Costs	Operating	Operating costs
Engine	MxBHP	Engine power (total)
Geometry (Wing)	Area	Wing area
	Span	Wing span
Performance (Cruise)	Speed	Speed @ cruise setting
Weight & Loading	MTOW	Maximum takeoff weight

2.19.6.3.1. **#1 – n**

Data relative to one limit

Properties :		
General	Mn	Lowest acceptable value. Value below this limit won't be displayed
	Mx	Highest acceptable value. Value above this limit won't be displayed

2.19.7. Export

Options relative to the export file format. Runs will be made successively according to input data.

Properties :		
Output File Format (Graph)	.bmp	Specifies to save the file as .bmp file format
	.pdf	Specifies to save the file as .pdf file format
	.png	Specifies to save the file as .png file format
	.svg	Specifies to save the file as .svg file format
Output File Format (Table)	.csv	Specifies to save the file as .csv file format
	.txt	Specifies to save the file as .txt file format

2.19.8. Advanced

Advanced options reserved for skilled user.

Subitems:	
Convergence Factors	Convergence factors
Iterations	Iterative Process
Propeller	Relating to how propeller performance will be computed
Performance	Relating to how performance will be computed
Aerodynamics	Relating to how aerodynamics will be computed

Properties :		
Airfoil	Auto-Update	Has to Update the Airfoil Dataset using XFoil. The Airfoil Dataset must allow auto-update
	Number of points	Total number of points to define the Upper Surface and the Lower Surface of the profile
Airplane	Auto Update	Has to automatically update during the computation the 3D-Model on the 3D View
Mesh Size (Mx)	Body	Maximum desired mesh size (length & width) for any body
	Lifting Surface	Maximum desired mesh size (length & width) for any lifting surface

2.19.8.1. *Convergence Factor*

Data relative to the Convergence Factors. During one iteration process, the final result will be assumed to be reached if the relative difference between the final value and the initial value is lower or equal than the convergence factor.

Properties :		
General	Is General	To use the same factor everywhere
	General	General Convergence Factor
Center of Gravity	CG	Center of gravity
Geometry	Fuselage Length	Length of the Fuselage
	Fuselage Wetted Area	Wetted Area of the Fuselage
	Wing Area	Wing Area
Performance	Flight Speed	Flight Speed
Propulsion	Propeller Efficiency	Propeller Efficiency
Weight	Fuel	Weight of Fuel
	Battery	Weight of Battery
	Mx Takeoff	Maximum Takeoff Weight

2.19.8.2. *Iterations*

Data relative to the Iterative Process.

Subitems:	
Number of iterations	Number of iterations

Properties :		
Iterative Process	Auto-Update	Has to Update the initial values used to start the iterative process. If selected, the convergence factors must be initialized in accordance with this, probably to 0.1%
	CG Position	Initial Center of Gravity Position to start the iteration process (% MAC)
	Cfe	Initial equivalent friction coefficient to start the iterative process in level flight.
	Payload Fraction	Initial Payload Fraction to start the iteration process
	Propeller Efficiency	Initial Propeller Efficiency to start the iterative process in Level Flight
	Wing Loading	Initial Wing Loading to start the iteration process

2.19.8.2.1. Number of Iterations

Data relative to the maximum Number of Iterations. Most of the time convergence is reached after about 6 iterations.

Properties :		
General	Is General	To use the same number of iteration everywhere
	General	General Number of Iteration
Center of Gravity	CG	Center of gravity
Geometry	Fuselage Length	Length of the Fuselage
	Fuselage Wetted Area	Wetted Area of the Fuselage
	Wing Area	Wing Area
Performance	Flight Speed	Flight Speed
Propulsion	Propeller Efficiency	Propeller Efficiency
Weight	Fuel	Weight of Fuel
	Battery	Weight of Battery
	Mx Takeoff	Maximum Takeoff Weight

2.19.8.3. *Propeller*

Data relating to how propeller performance will be computed.

Properties :		
Propeller Efficiency computed by	Interpolation	The propeller efficiency will be computed by polynomial interpolation of digitized dots. This method is faster but less accurate than the polynomial regression
	Regression	The propeller efficiency will be computed by polynomial regression of digitized dots. This method is much longer but more accurate than the polynomial interpolation
Propeller Efficiency computed from	Charts (80)	The propeller efficiency is computed from Propeller Performance Charts taking into account: - The number of blades (2 – 3 – 4) - The activity factor (80) - The integrated design lift coefficient (Clark Y)
	Charts (80-180)	The propeller efficiency is computed from Propeller Performance Charts taking into account: - The number of blades (3 – 4) - The activity factor (80 to 180)) - The integrated design lift coefficient (0.15 to 0.70)
	Polynomial Equation	The propeller efficiency is computed from a Polynomial Equation
Propeller Efficiency Mx Blade AF	Mx Blade AF	Maximum Blade Activity Factor. In order to remain within the range of validity of the propeller performance charts during the search for the point of maximum efficiency, it is necessary to impose a maximum activity factor. This will impose the minimum diameter of the propeller. Recommended value: between 80 and 140

2.19.8.4. *Performance*

Data relating to how performance will be computed.

Properties :		
Performance Computed	Deviation I	Maximum deviation between computed value and given value. Il computed value differs more than Deviation I, the computed value will be displayed accordingly
	Deviation II	Maximum deviation between computed value and given value. Il computed value differs more than Deviation II, the computed value will be displayed accordingly
	Deviation III	Maximum deviation between computed value and given value. Il computed value differs more than Deviation III, the computed value will be displayed accordingly
Performance Hovering	Cl, Cd Determination	Select the method to compute the aerodynamic coefficients cl and cd: - Airfoil Method - Prouty Method Cf.TN04-30 for additional information
	Mx Collective Pitch	Maximum pitch angle of rotor blades
	Number of blade elements	The performance of the rotor is computed from the blade element theory. Each blade is broken down into several small blades elements. The aerodynamic forces are determined on these small parts.
	Thrust Factor	To have a good control authority it is recommended that the maximum thrust provided by the rotors be approximately 1.5 to 2 times its weight. The maximum takeoff weight is multiplied by the Thrust Factor to determine the minimum thrust required.
Performance Landing	HLD Drag Efficiency	Fudge Factor used to tune the drag prediction of high lift device when deflected
	Idle Thrust	Idle thrust expressed according to the weight of the airplane
Performance Maximum Rate of Climb	Flight Speed (Mn)	Minimum flight speed when computing the speed polar (% Vs0)
	Flight Speed (Mx)	Maximum flight speed when computing the speed polar (% Vs0)
	Flight Speed (Step)	Flight speed step when computing the speed polar

2.19.8.5. *Aerodynamics*

Data relating to how aerodynamics will be computed.

Properties :		
Aerodynamics	Cd0 (Cf)	Specifies that the zero lift drag coefficient of lifting surfaces will be computed from the turbulent flat plate friction coefficient. This method is less accurate than from the airfoil polar (by default)
	Is Parabolic Drag Polar	To consider the drag polar as parabolic. If not, the drag polar may be shifted to positive value of cl due to the camber of the airfoil profile
	Lift Distribution	Method to compute the Lift Distribution
	Oswald Factor	Method to compute the Oswald Efficiency Factor

2.19.9. Dynamic Stability

Options relative to the computation Dynamic Stability

Properties :		
Flight Conditions	Altitude	Flight Altitude
	CG Position	Center of Gravity Location (% MAC)
	Flaps Setting	Flaps Setting
	Flight Speed	Flight Speed (TAS)
	Weight	Flight Weight
Loading	Fuel	Fuel Weight
	Payload	Payload
CG (Loading)	Fuel	Center of Gravity Location (% MAC)
	Payload	Center of Gravity Location (% Fuselage Length)
Configuration	Is Power ON	To compute Power ON
Moment of Inertia	Has to Define	The values must be defined by the user
	Has to Update	To initialize/update the user defined MOI by the computed MOI
Stability Derivatives	Has to Define	The values must be defined by the user
	Has to Update	To initialize/update the user defined derivatives by the computed derivatives

2.19.9.1. *MOI*

User defined values (‘**Has to Define’** must be checked to display them)

Properties :		
Moment of Inertia	Ixx	Moment of Inertia around x-axis
	Ixz	Product of Inertia ($\Sigma m_k x_k z_k$)
	Iyy	Moment of Inertia around y-axis
	Izz	Moment of Inertia around z-axis

2.19.9.2. *Control Derivatives*

User defined values (‘**Has to Define’** must be checked to display them)

Properties :		
Aileron	Cla	Rolling-moment-due-to-aileron Derivative
	Cna	Yawing-moment-due-to-aileron Derivative
	Cya	Side-force-due-to-aileron Derivative
Canardvator	CdCrdv	Drag-due-to-canardvator Derivative
	ClCrdv	Lift-due-to-canardvator Derivative
	CmCrdv	Pitching-moment-due-to-canardvator Derivative
Elevator	CdElev	Drag-due-to-elevator Derivative
	ClElev	Lift-due-to-elevator Derivative
	CmElev	Pitching-moment-due-to-elevator Derivative
Rudder	ClRdr	Rolling-moment-due-to-rudder Derivative
	CnRdr	Yawing-moment-due-to-rudder Derivative
	CyRdr	Side-force-due-to-rudder Derivative
Spoiler	Clspl	Rolling-moment-due-to-spoiler Derivative
	Cnspl	Yawing-moment-due-to-spoiler Derivative
	Cyspl	Side-force-due-to-spoiler Derivative

2.19.9.3. *Longitudinal Stability Derivatives*

User defined values (‘**Has to Define’** must be checked to display them)

Properties :		
Angle of Attack	CmAOA	Pitching-moment-due-to-angle-of-attack Derivative
	CdAOA	Drag-due-to-angle-of-attack Derivative
	ClAOA	Lift-due-to-angle-of-attack Derivative
Pitch Rate	Cmq	Pitching-moment-due-to-pitch-rate Derivative
	Clq	Lift-due-to-pitch-rate Derivative
Rate of Angle of Attack	CmRAOA	Pitching-moment-due-to-rate-of-angle-of-attack Derivative
	ClRAOA	Lift-due-to-rate-of-angle-of-attack Derivative
Speed	Cmu	Pitching-moment-due-to-speed Derivative
	Cdu	Drag-due-to-speed Derivative
	Clu	Lift-due-to-speed Derivative
Steady State Coefficient	Cl1	Airplane steady state lift coefficient

2.19.9.4. *Lateral Stability Derivatives*

User defined values (‘**Has to Define’** must be checked to display this property display)

Properties :		
Lateral speed	Clv	Rolling-moment-due-to-lateral-speed Derivative
	Cnv	Yawing-moment-due-to-lateral-speed Derivative
	Cyv	Side-force-due-to-lateral-speed Derivative
Roll Rate	Clp	Rolling-moment-due-to-roll-rate Derivative
	Cnp	Yawing-moment-due-to-roll-rate Derivative
	Cyp	Side-force-due-to-roll-rate Derivative
Yaw Rate	Clr	Rolling-moment-due-to-yaw-rate Derivative
	Cnr	Yawing-moment-due-to-yaw-rate Derivative
	Cyr	Side-force-due-to-yaw-rate Derivative

2.19.9.5. *Processing*

The user has to specify the type of analysis he wants to perform

Properties :		
Free Response (eigenmodes)	Lateral	To compute the Lateral Eigenmodes
	Longitudinal	To compute the Longitudinal Eigenmodes
Frequential Response	Aileron	To compute the Frequential Response to a Harmonic input of the aileron
	Canardvator	To compute the Frequential Response to a Harmonic input of the canardvator
	Elevator	To compute the Frequential Response to a Harmonic input of the elevator
	Rudder	To compute the Frequential Response to a Harmonic input of the rudder
Step Response	Aileron	To compute the Response to a step input of the aileron
	Canardvator	To compute the Response to a step input of the canardvator
	Elevator	To compute the Response to a step input of the elevator
	Rudder	To compute the Response to a step input of the rudder
Step Response – Deflection	Aileron	Aileron deflection
	Canardvator	Canardvator deflection
	Elevator	Elevator deflection
	Rudder	Rudder deflection
	Time Range	Duration during which the movement of the aircraft is analyzed. May be cut short if the aircraft hits the ground (Z = 0m)
Step Response – Flight Path	Aileron	Display the flight path due to an aileron sudden deflection
	Canardvator	Display the flight path due to a canardvator sudden deflection
	Elevator	Display the flight path due to an elevator sudden deflection
	Rudder	Display the flight path due to a rudder sudden deflection

2.19.10. Drag Table

Data relative to the generation of the Drag Table (**specific to Airliners**)

Properties :		
Centre of Gravity	CG Margin	Distance from CG and Aerodynamic Centre (% MAC)
Altitude	Altitude	Reference altitude
Lift Coefficient	Cl_0	Initial value
	Cl_1	Final value
	Cl_{Step}	Step value
Mach Number	MN_0	Initial value
	MN_1	Final value
	MN_{Step}	Step value

2.19.11. Cruise Table

Data relative to the generation of the Cruise Table (**specific to Airliners**)

Properties :		
Centre of Gravity	CG Margin	Distance from CG and Aerodynamic Centre (% MAC)
Altitude	Alt_0	Initial value
	Alt_1	Final Value
	Alt_{Step}	Step Value
Mach Number	MN_0	Initial value
	MN_1	Final Value
	MN_{Step}	Step Value
Weight	W_0	Initial value
	W_1	Final Value
	W_{Step}	Step Value

2.19.12. Payload Chart

Data relative to the generation of the Payload Chart

Properties :		
Centre of Gravity	Altitude	Reference altitude
	CG Margin	Distance from CG and Aerodynamic Centre (% MAC)
	Mach Number	Mach Number
Distance	Climb	Distance travelled during the Climb Phase
	Descent	Distance travelled during the Descent Phase
Fuel	Climb	Fuel burned during the Climb Phase
	Descent	Fuel burned during the Descent Phase
	Reserve	Total Reserve Fuel
Loading	Description	Description of the Payload (E.g. Pax 120)
	Payload	The range will be computed for this specific payload. Most of the time this value is taken equal to the design payload

2.19.13. SAR Chart

Data relative to the generation of the Specific Air Range Chart (**specific to Airliners**)

Properties :		
General	Initialize Cruise Table	The SAR Chart is generated from the Cruise Table. The Cruise Table may be computed before generating the SAR Chart, or the SAR Chart may be generated from previously computed data
Reference Altitudes	Low	Low Altitude
	Mid	Mid Altitude
	High	High Altitude
Reference Mach Number	Low	Low Mach Number
	Mid	Mid Mach Number
	High	High Mach Number

2.19.14. Meshing

List of items to be meshed (**specific to Structural Analysis**)

Properties :		
General	Save Checked Parts	Specifies that the selected parts will be saved
Main Parts	Engine Nacelle	Specifies that this selected part will be meshed
	Engine Pylon	
	Fuselage	
	Horizontal Tail	
	Vertical Tail	
	Wing	
Subparts - Fuselage	Anchors	Specifies that this selected subparts will affect the meshing process. Meshing points will be located @ their borders. These subparts will be meshed individually.
	Doors - Cargo Doors	
	Doors - Emergency Exits	
	Doors - Gear Bays	
	Doors - Pax Doors	
	ST - Frames	
Subparts – Horizontal Tail	Anchors	
	CS - Elevators	
	ST - Ribs	
	ST - Spars	
Subparts – Vertical Tail	Anchors	
	CS - Rudders	
	ST - Ribs	
	ST - Spars	
Subparts – Wing	Anchors	
	CS - Ailerons	
	CS - Spoilers	
	HLD - Leading Edge Devices	
	HLD - Trailing Edge Devices	
	ST - Ribs	
	ST - Spars	

2.20. 3D Display

List of additional items to be displayed on the 3D View. The geometry and the position of these items are defined by computation.

Properties :		
Options	Axis XYZ	To display the Main Axis on the 3D View
	Tooltip Text	To display the Tooltip Text on the 3D View
Elements to display (Airplane)	CG	To display the CG of the airplane
	MAC	To display the MAC of the airplane
Elements to display (Items)	CG	To display the CG for each components of the airplane
	MAC	To display the MAC for each components of the airplane
Ground Surface	Is Visible	To display or hide the ground surface
	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency
Water Surface	Is Visible	To display or hide the water surface
	Blue	Blue, between 0 and 255
	Green	Green, between 0 and 255
	Red	Red, between 0 and 255
	Opacity	Specifies the level of Opacity of the current 3D Model (from 0 to 100). 100 means maximum opacity. 0 means maximum transparency

3. Operations on the airplane dataset

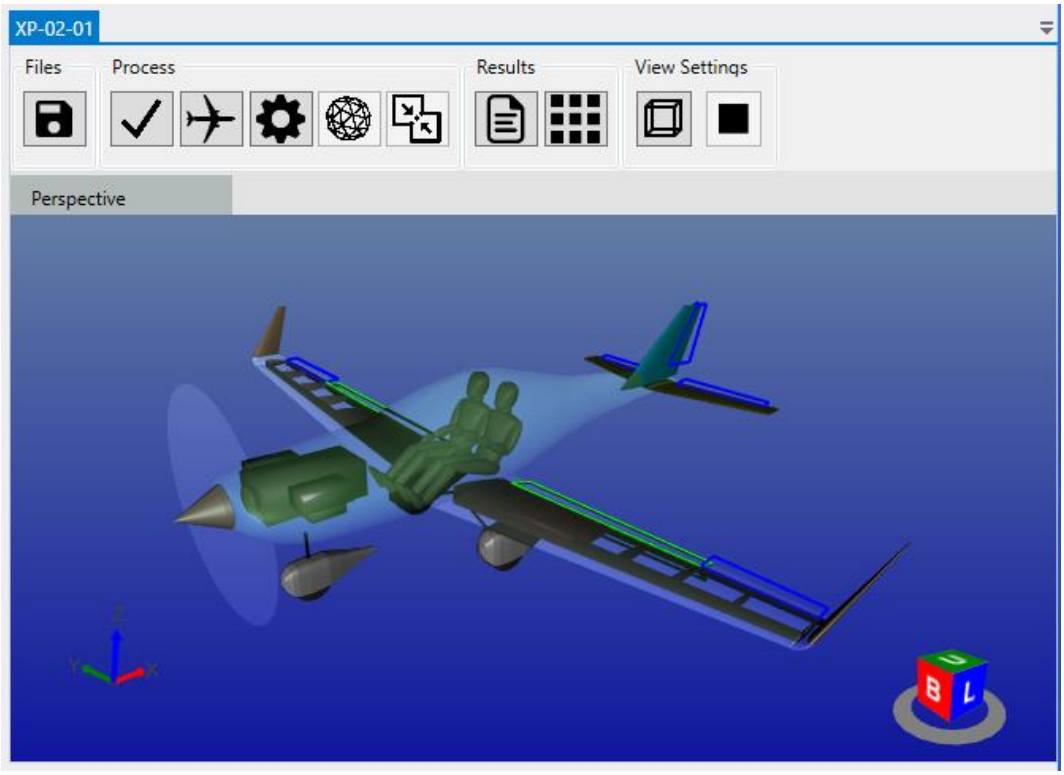
3.1. Introduction

Each airplane dataset may be computed for a specific purpose.

This is defined in the **Processing** branch.

Properties :		
Is Computed For	Computed For	List of authorized processes, function of the user's license - Design Level 1 - Design Level 2 - Performance Analysis - Reverse Engineering

The computation is launched **from the 3D-Window** by clicking on 



During the run, some information are displayed in the

1. Status Bar, located at the bottom of the Main Window
2. Process Area
3. Output Area

to inform the user about the calculation progress.

3.2. Operations from the 3D-Window

Top Menu :		
File		**To save** the current airplane dataset (the airplane which is displayed on the 3D View). Input data and computed values, if any. ➔ The File Path is displayed in the Compile Window
Process		**To list** the Missing Data. ➔ Missing Data are listed in the Output Area
		**To compute** the Geometry of the current dataset ➔ Some results are displayed in the Output Area. All results are available in the Document 
		**To perform computation** on the current dataset according to the "Computed For" option (cf. Processing/Is Computed for) ➔ Some results are displayed in the Output Area. All results are available in the Document 
		**Specific to Structural Analysis** **To mesh** the selected main parts (cf. Processing/Meshing) Mass Properties : are assigned to every mesh ➔ STL files are generated and saved for every single part (File name : _M) ➔ One STL file is generated and saved for all parts put together ➔ File Paths are displayed in the Compile Window
		**Specific to Structural Analysis** **To merge** the different meshing in order to generate a single mesh ➔ One STL file is generated and saved (File name : _MF) ➔ File path is displayed in the Compile Window
Results		**To generate** a report
		**To load** the results in a spreadsheet

4. Results display

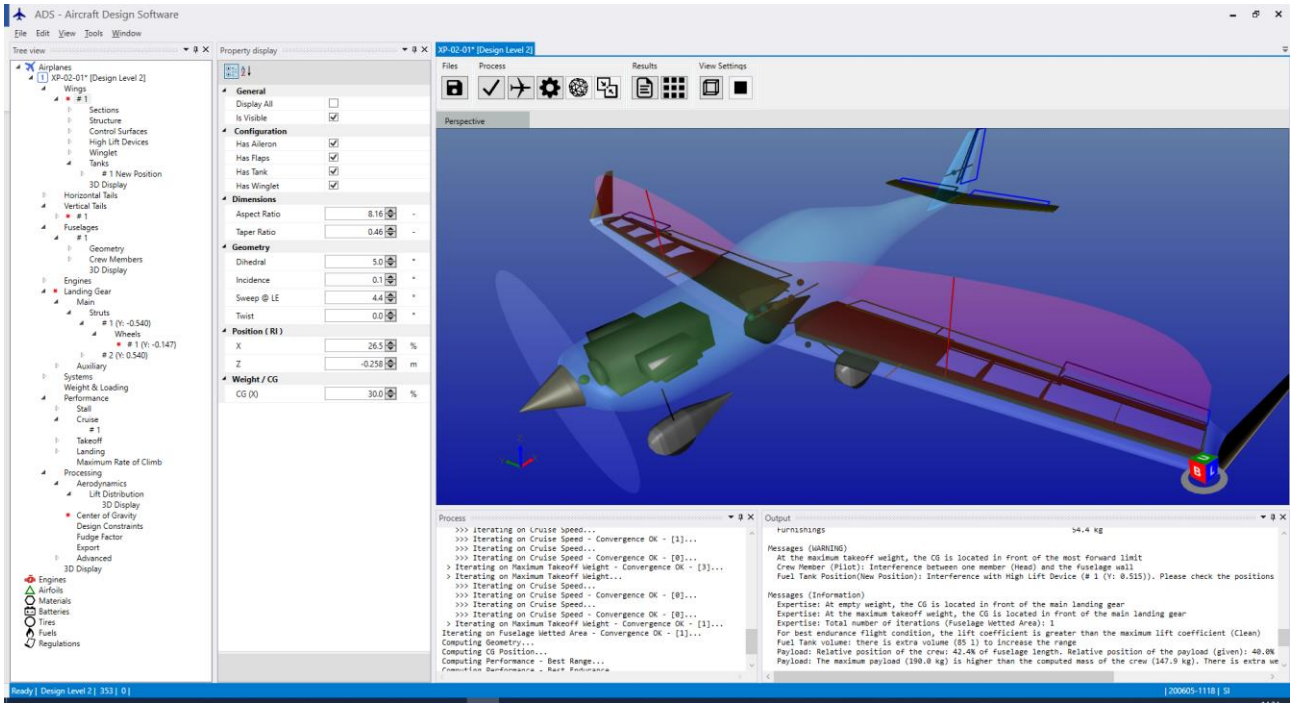
The results are displayed in different forms:

1. On the 3D-Models
2. On the Output Area
3. In Tables
4. In Graphs
5. In the Airplane Report

Processing	3D-Models	Airplane Report	Output Area	Tables	Graphs
Geometry	x	x	x		
Design Level 1	x	x	x	x	x
Design Level 2	x	x	x		
Performance Analysis	x	x	x	x	x
Lift Distribution	x		x		
Computation launched from Contextual Menu			x		

4.1. 3D-Model

The 3D-Model is automatically generated and displayed



The 3D-Model is the computed geometry. All components are placed at the calculated position.

Additional items are displayed according to the Display Options (3D Display)

- Lift distribution
- Center of gravities
- Mean Aerodynamic Chords
- Aerodynamic Center
- Maneuvering point
- Tooltip texts
- …

4.2. Airplane Report

Airplane Report

0DS-02-01

Stability | Cost-Market Price | Cruise | Best Rate of Climb | Takeoff | Landing | Stall | Quality | Statistics | Notes

Summary | Wing | Horizontal Tail | Vertical Tail | Fuselage | Powerplant | Landing Gear | Systems | Mass | CG

DIMENSIONS, EXTERNAL:		
Model	0DS-02-01*	
Type:	Light Airplane	
Structure	Composite & Light Alloy	
Powerplant	1 Rotax-Bombardier Rotax 912-ULS	
Length overall	5.007	m
Height overall	1.905	m
Wing span	6.085	m
Wing aspect ratio	10.9	-
Fuselage length	4.930	m
Fuselage Mx diameter	0.664	m
Tailplane span	1.641	m
Wheel track	1.047	m
Wheel base	3.945	m
AREAS		
Airplane wetted area	16.565	m²
Wing, true	3.384	m²
Wing, projected	3.366	m²
Ailerons (total)	0.204	m²
Trailing-edge flaps (total)	0.312	m²
Horizontal tail, projected	0.741	m²
Vertical tail, projected	0.369	m²
Elevator (total)	0.206	m²
Rudder (total)	0.094	m²
WEIGHTS AND LOADINGS		
Maximum takeoff weight	262	kg
Empty weight	171	kg
Mx fuel weight	11	kg
Mx landing weight	262	kg
Mx wing loading	77.3	kg/m²
Mx power loading	3.791	kg/kW
PERFORMANCE		
Cruising speed	362	km/h
Cruising altitude	100	m
Takeoff field length	147	m
Landing field length	234	m
MASS, COMPUTED:		
Structure Group		

Font Size - +

More than 1200 information are presented in the Airplane Report, covering :

- The airplane geometry
  - Wing
  - Tails
  - Fuselage
  - Landing gear
- The propulsion
  - List of engines (**Specific to Design Level 1**)
- The weight and Loading
  - Total mass
  - Mass of each component
- The stability
  - Center of gravity position (CG)
  - CG Range
  - Stability derivatives (>60) @ different flight conditions
- The performance
  - Cruise, Best Range, Best Endurance
  - Takeoff, Landing
  - Best Rate of Climb
- The costs
  - Market price
  - Operating costs
  - Development costs
- The crew Members
  - Position
  - Comfort
  - Clearance with fuselage wall

The font size may be modified clicking on 

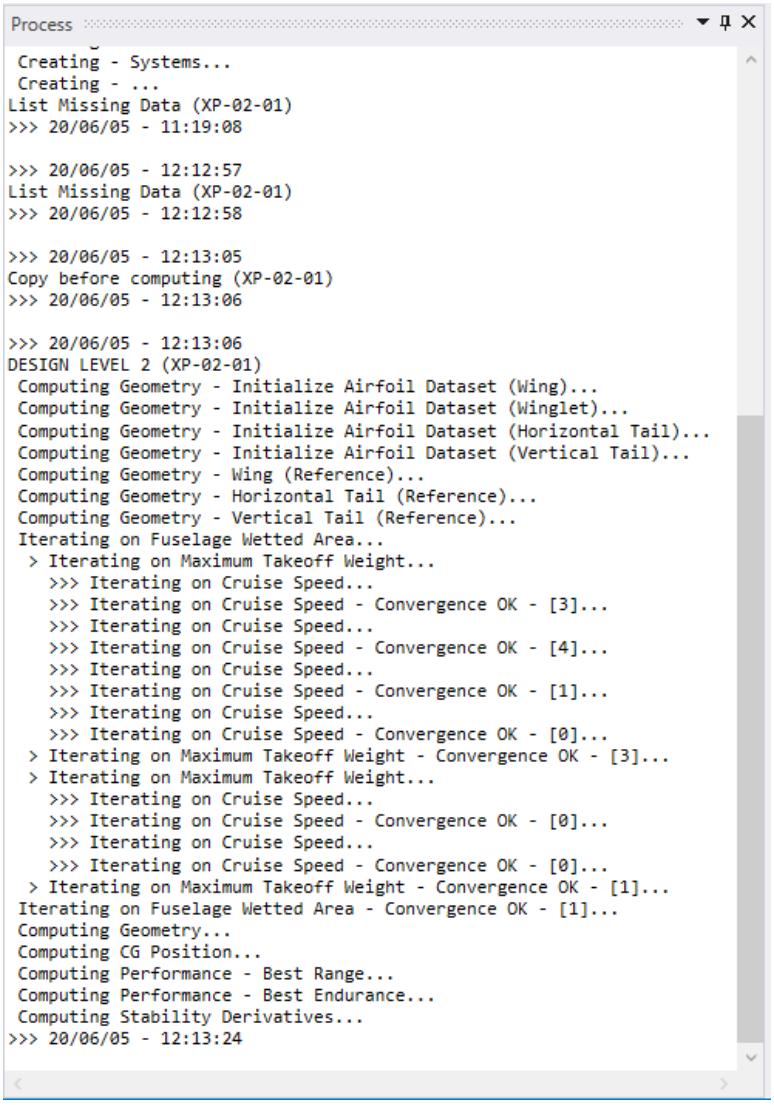
Right click :

The airplane report may be :

- Copied in the clipboard as text or csv file format
- Saved as text or csv file format
- Saved as doc file

4.3. Process Area

The Process Area gathers the information related to the tasks performed during the computing process.



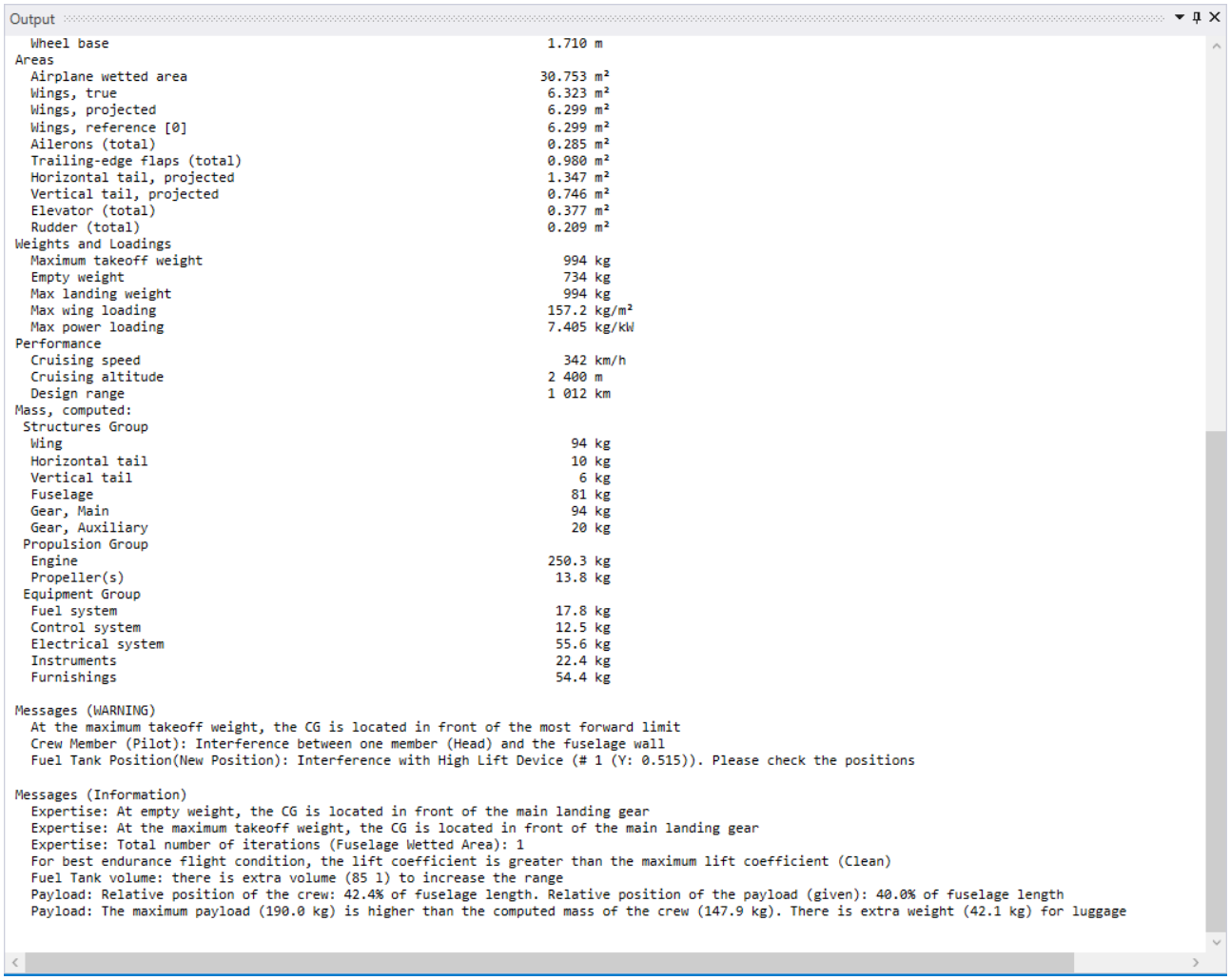
Right click :

The content of the Process Area may be :

- Cleared at any time,
- Copied or
- Saved

4.4. Output Area

The Output Area contains the computed values and some messages (information or warning) related to the results.



```
Output
  Wheel base                                          1.710 m
Areas
  Airplane wetted area                               30.753 m²
  Wings, true                                         6.323 m²
  Wings, projected                                    6.299 m²
  Wings, reference [0]                                6.299 m²
  Ailerons (total)                                    0.285 m²
  Trailing-edge flaps (total)                         0.980 m²
  Horizontal tail, projected                          1.347 m²
  Vertical tail, projected                            0.746 m²
  Elevator (total)                                    0.377 m²
  Rudder (total)                                      0.209 m²
Weights and Loadings
  Maximum takeoff weight                                994 kg
  Empty weight                                          734 kg
  Max landing weight                                    994 kg
  Max wing loading                                  157.2 kg/m²
  Max power loading                                 7.405 kg/kW
Performance
  Cruising speed                                        342 km/h
  Cruising altitude                                   2 400 m
  Design range                                        1 012 km
Mass, computed:
 Structures Group
  Wing                                                   94 kg
  Horizontal tail                                        10 kg
  Vertical tail                                           6 kg
  Fuselage                                               81 kg
  Gear, Main                                             94 kg
  Gear, Auxiliary                                        20 kg
 Propulsion Group
  Engine                                              250.3 kg
  Propeller(s)                                         13.8 kg
 Equipment Group
  Fuel system                                          17.8 kg
  Control system                                       12.5 kg
  Electrical system                                    55.6 kg
  Instruments                                          22.4 kg
  Furnishings                                          54.4 kg

Messages (WARNING)
  At the maximum takeoff weight, the CG is located in front of the most forward limit
  Crew Member (Pilot): Interference between one member (Head) and the fuselage wall
  Fuel Tank Position(New Position): Interference with High Lift Device (# 1 (Y: 0.515)). Please check the positions

Messages (Information)
  Expertise: At empty weight, the CG is located in front of the main landing gear
  Expertise: At the maximum takeoff weight, the CG is located in front of the main landing gear
  Expertise: Total number of iterations (Fuselage Wetted Area): 1
  For best endurance flight condition, the lift coefficient is greater than the maximum lift coefficient (Clean)
  Fuel Tank volume: there is extra volume (85 l) to increase the range
  Payload: Relative position of the crew: 42.4% of fuselage length. Relative position of the payload (given): 40.0% of fuselage length
  Payload: The maximum payload (190.0 kg) is higher than the computed mass of the crew (147.9 kg). There is extra weight (42.1 kg) for luggage
```

The Output Area may also contain results computed from the Tree View such as:

- The minimum cockpit size
- The relative position of crew members
- The clearance around the crew members
- The anthropometric characteristics of crew members
- The volume of the bodies
- The volume of fuel tanks
- The lift distribution on lifting surfaces
- The geometric and aerodynamics characteristics of airfoils
- …

Right click :

The content of the Output Area may be :

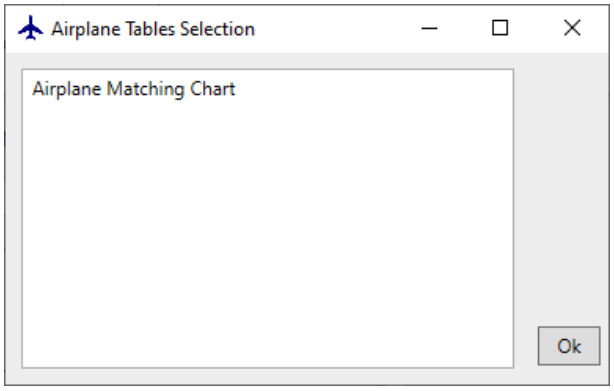
- Cleared at any time,
- Copied or
- Saved

4.5. Tables and graphs

Some results may be displayed under the form of table and graphs:

	3D-Models	Airplane Report	Output Area	Tables	Graphs
Geometry	x	x	x		
Design Level 1	x	x	x	x	x
Design Level 2	x	x	x		
Performance Analysis	x	x	x	x	x
Lift Distribution	x		x		
Computation launched from Contextual Menu			x		

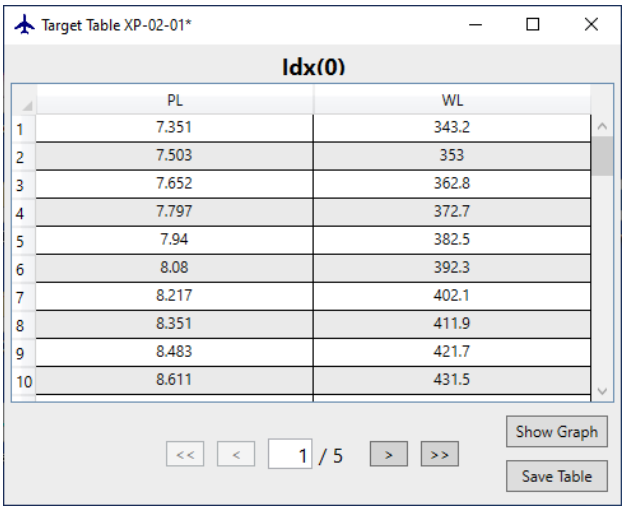
Click on  to display the list of all datasets that can be displayed under the form of tables and graphs



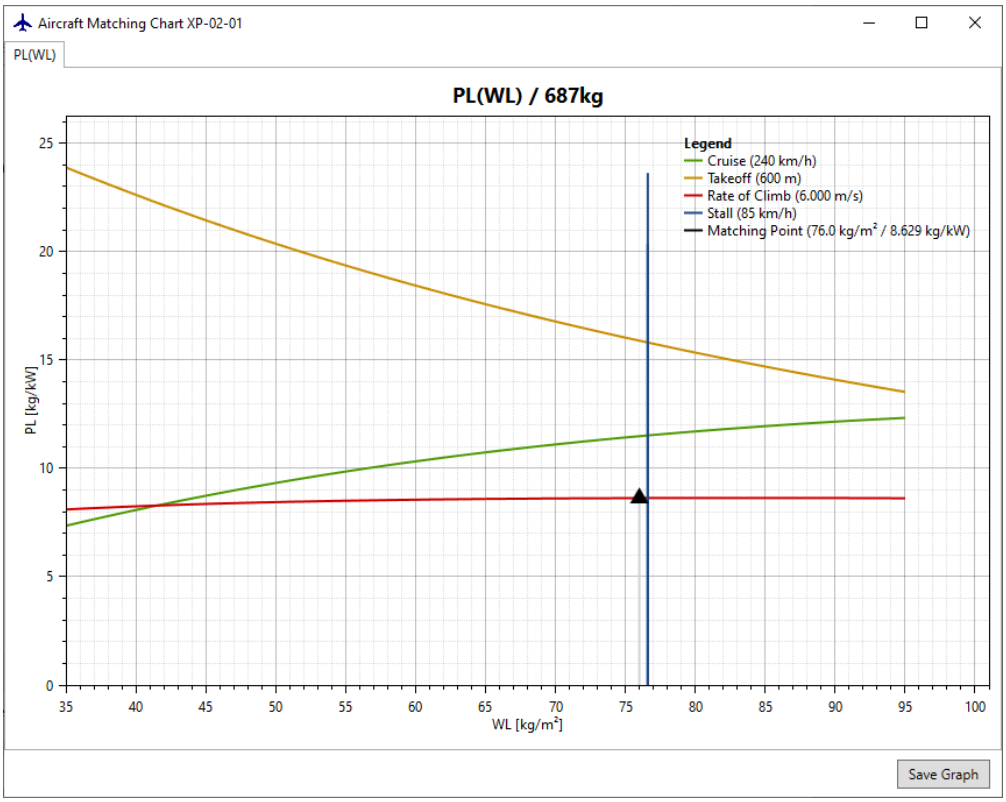
Select one dataset and click on **OK** to load the table and the graph

4.5.1. Airplane Matching Chart

Processing/Category: **Specific to Design Level 1 / All categories**



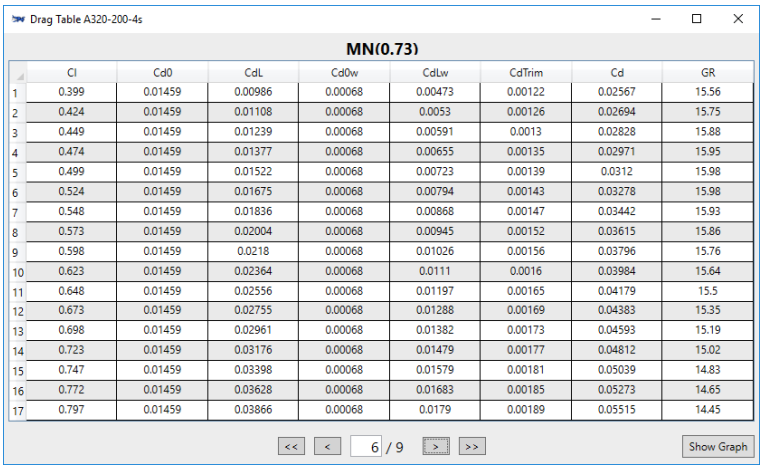
Show Graph	To Load the graph
Save Table	To Save the table (.txt or .csv file format)



Save Graph	To Save the Graph (.bmp, .pdf, .png or .svg file format)

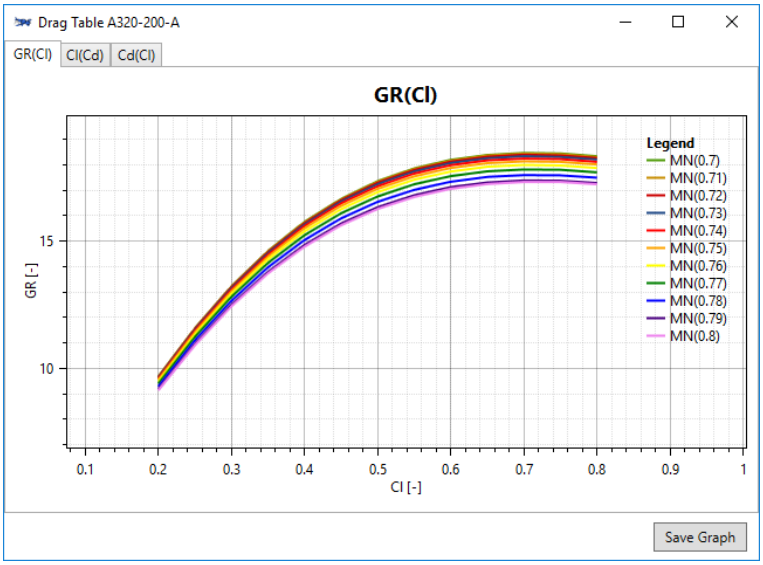
4.5.2. Drag Table

Processing/Category: **Specific to Performance Analysis / Airliners**



Cl	Cd0	CdL	Cd0w	CdLw	CdTrim	Cd	GR
0.399	0.01459	0.00986	0.00068	0.00473	0.00122	0.02567	15.56
0.424	0.01459	0.01108	0.00068	0.0053	0.00126	0.02694	15.75
0.449	0.01459	0.01239	0.00068	0.00591	0.0013	0.02828	15.88
0.474	0.01459	0.01377	0.00068	0.00655	0.00135	0.02971	15.95
0.499	0.01459	0.01522	0.00068	0.00723	0.00139	0.0312	15.98
0.524	0.01459	0.01675	0.00068	0.00794	0.00143	0.03278	15.98
0.548	0.01459	0.01836	0.00068	0.00868	0.00147	0.03442	15.93
0.573	0.01459	0.02004	0.00068	0.00945	0.00152	0.03615	15.86
0.598	0.01459	0.0218	0.00068	0.01026	0.00156	0.03796	15.76
0.623	0.01459	0.02364	0.00068	0.0111	0.0016	0.03984	15.64
0.648	0.01459	0.02556	0.00068	0.01197	0.00165	0.04179	15.5
0.673	0.01459	0.02755	0.00068	0.01288	0.00169	0.04383	15.35
0.698	0.01459	0.02961	0.00068	0.01382	0.00173	0.04593	15.19
0.723	0.01459	0.03176	0.00068	0.01479	0.00177	0.04812	15.02
0.747	0.01459	0.03398	0.00068	0.01579	0.00181	0.05039	14.83
0.772	0.01459	0.03628	0.00068	0.01683	0.00185	0.05273	14.65
0.797	0.01459	0.03866	0.00068	0.0179	0.00189	0.05515	14.45

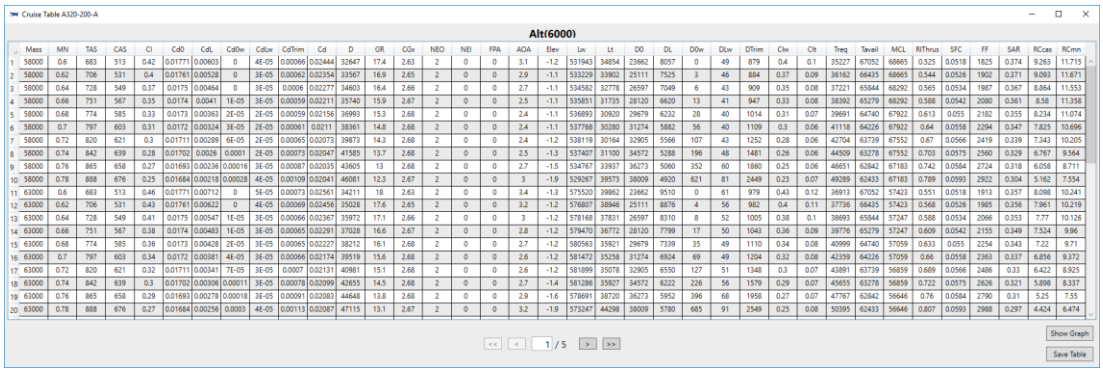
Show Graph	To Load the graph
Save Table	To Save the table (.txt or .csv file format)



Save Graph	To Save the Graph (.bmp, .pdf, .png or .svg file format)

4.5.3. Cruise Table

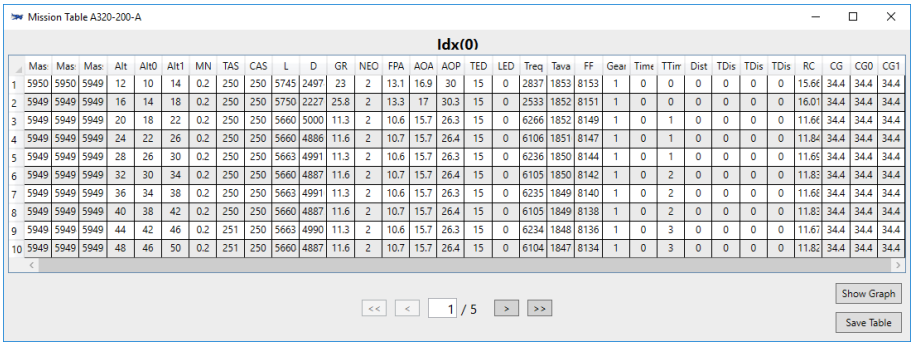
Processing/Category: **Specific to Performance Analysis / Airliners**



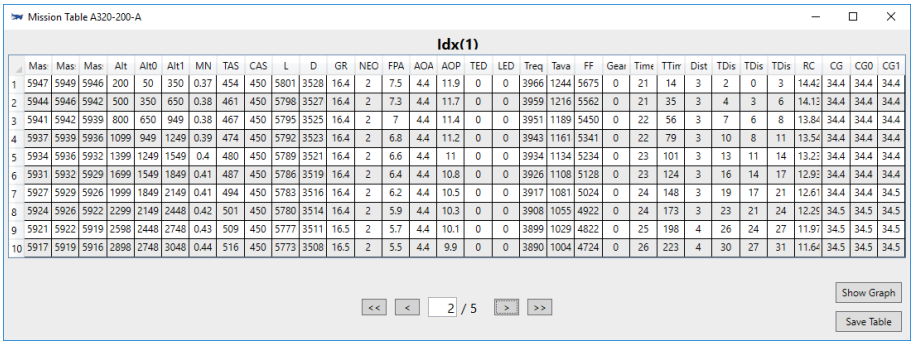
Show Graph	
Save Table	To Save the table (.txt or .csv file format)

4.5.4. Mission Table

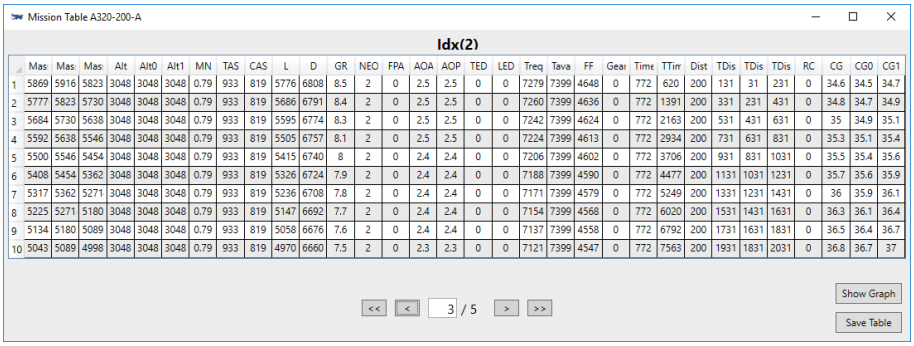
Processing/Category: **Specific to Performance Analysis / Airliners**



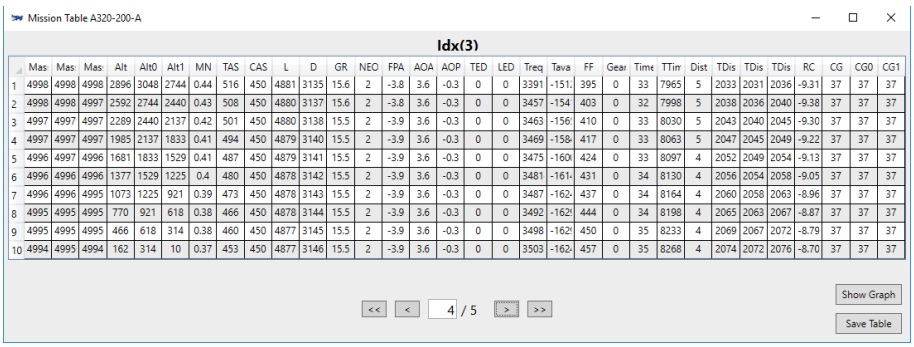
	Mas	Mas	Mas	Alt	Alt0	Alt1	MN	TAS	CAS	L	D	GR	NEO	FPA	AOA	AOP	TED	LED	Treq	Tava	FF	Gear	Time	TTim	Dist	TDis	TDis	TDis	RC	CG	CG0	CG1
1	5950	5950	5949	12	10	14	0.2	250	250	5745	2497	23	2	13.1	16.9	30	15	0	2837	1853	8153	1	0	0	0	0	0	0	15.66	34.4	34.4	34.4
2	5949	5949	5949	16	14	18	0.2	250	250	5750	2227	25.8	2	13.3	17	30.3	15	0	2533	1852	8151	1	0	0	0	0	0	0	16.01	34.4	34.4	34.4
3	5949	5949	5949	20	18	22	0.2	250	250	5660	5000	11.3	2	10.6	15.7	26.3	15	0	6266	1852	8149	1	0	1	0	0	0	0	11.66	34.4	34.4	34.4
4	5949	5949	5949	24	22	26	0.2	250	250	5660	4886	11.6	2	10.7	15.7	26.4	15	0	6106	1851	8147	1	0	1	0	0	0	0	11.84	34.4	34.4	34.4
5	5949	5949	5949	28	26	30	0.2	250	250	5663	4991	11.3	2	10.6	15.7	26.3	15	0	6236	1850	8144	1	0	1	0	0	0	0	11.65	34.4	34.4	34.4
6	5949	5949	5949	32	30	34	0.2	250	250	5660	4887	11.6	2	10.7	15.7	26.4	15	0	6105	1850	8142	1	0	2	0	0	0	0	11.83	34.4	34.4	34.4
7	5949	5949	5949	36	34	38	0.2	250	250	5663	4991	11.3	2	10.6	15.7	26.3	15	0	6235	1849	8140	1	0	2	0	0	0	0	11.66	34.4	34.4	34.4
8	5949	5949	5949	40	38	42	0.2	250	250	5660	4887	11.6	2	10.7	15.7	26.4	15	0	6105	1849	8138	1	0	2	0	0	0	0	11.83	34.4	34.4	34.4
9	5949	5949	5949	44	42	46	0.2	251	250	5663	4990	11.3	2	10.6	15.7	26.3	15	0	6234	1848	8136	1	0	3	0	0	0	0	11.67	34.4	34.4	34.4
10	5949	5949	5949	48	46	50	0.2	251	250	5660	4887	11.6	2	10.7	15.7	26.4	15	0	6104	1847	8134	1	0	3	0	0	0	0	11.82	34.4	34.4	34.4



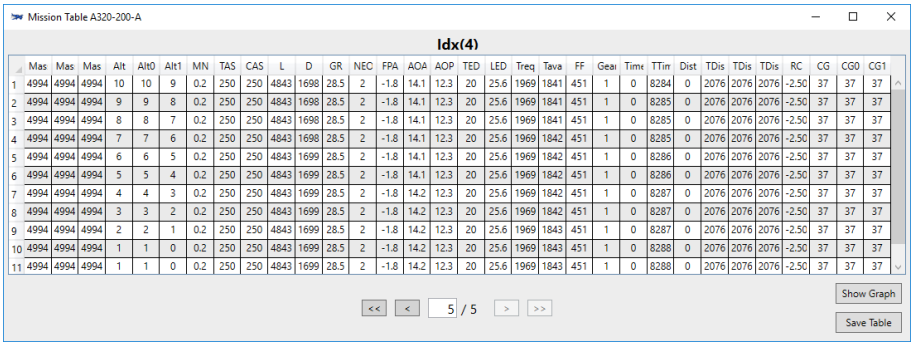
	Mas	Mas	Mas	Alt	Alt0	Alt1	MN	TAS	CAS	L	D	GR	NEO	FPA	AOA	AOP	TED	LED	Treq	Tava	FF	Gear	Time	TTim	Dist	TDis	TDis	TDis	RC	CG	CG0	CG1
1	5947	5949	5946	200	50	350	0.37	454	450	5801	3528	16.4	2	7.5	4.4	11.9	0	0	3966	1244	5675	0	21	14	3	2	0	3	14.42	34.4	34.4	34.4
2	5944	5946	5942	500	350	650	0.38	461	450	5798	3527	16.4	2	7.3	4.4	11.7	0	0	3959	1216	5562	0	21	35	3	4	3	6	14.13	34.4	34.4	34.4
3	5941	5942	5939	800	650	949	0.38	467	450	5795	3525	16.4	2	7	4.4	11.4	0	0	3951	1189	5450	0	22	56	3	7	6	8	13.84	34.4	34.4	34.4
4	5937	5939	5936	1099	949	1249	0.39	474	450	5792	3523	16.4	2	6.8	4.4	11.2	0	0	3943	1161	5341	0	22	79	3	10	8	11	13.54	34.4	34.4	34.4
5	5934	5936	5932	1399	1249	1549	0.4	480	450	5789	3521	16.4	2	6.6	4.4	11	0	0	3934	1134	5234	0	23	101	3	13	11	14	13.23	34.4	34.4	34.4
6	5931	5932	5929	1699	1549	1849	0.41	487	450	5786	3519	16.4	2	6.4	4.4	10.8	0	0	3926	1108	5128	0	23	124	3	16	14	17	12.93	34.4	34.4	34.4
7	5927	5929	5926	1999	1849	2149	0.41	494	450	5783	3516	16.4	2	6.2	4.4	10.5	0	0	3917	1081	5024	0	24	148	3	19	17	21	12.61	34.4	34.4	34.5
8	5924	5926	5922	2299	2149	2448	0.42	501	450	5780	3514	16.4	2	5.9	4.4	10.3	0	0	3908	1055	4922	0	24	173	3	23	21	24	12.29	34.5	34.5	34.5
9	5921	5922	5919	2598	2448	2748	0.43	509	450	5777	3511	16.5	2	5.7	4.4	10.1	0	0	3899	1029	4822	0	25	198	4	26	24	27	11.97	34.5	34.5	34.5
10	5917	5919	5916	2898	2748	3048	0.44	516	450	5773	3508	16.5	2	5.5	4.4	9.9	0	0	3890	1004	4724	0	26	223	4	30	27	31	11.64	34.5	34.5	34.5



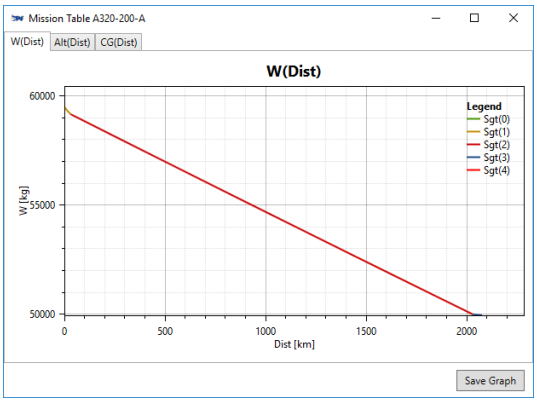
	Mas	Mas	Mas	Alt	Alt0	Alt1	MN	TAS	CAS	L	D	GR	NEO	FPA	AOA	AOP	TED	LED	Treq	Tava	FF	Gear	Time	TTim	Dist	TDis	TDis	TDis	RC	CG	CG0	CG1
1	5869	5916	5823	3048	3048	3048	0.79	933	819	5776	6808	8.5	2	0	2.5	2.5	0	0	7279	7399	4648	0	772	620	200	131	31	231	0	34.6	34.5	34.7
2	5777	5823	5730	3048	3048	3048	0.79	933	819	5686	6791	8.4	2	0	2.5	2.5	0	0	7260	7399	4636	0	772	1391	200	331	231	431	0	34.8	34.7	34.9
3	5684	5730	5638	3048	3048	3048	0.79	933	819	5595	6774	8.3	2	0	2.5	2.5	0	0	7242	7399	4624	0	772	2163	200	531	431	631	0	35	34.9	35.1
4	5592	5638	5546	3048	3048	3048	0.79	933	819	5505	6757	8.1	2	0	2.5	2.5	0	0	7224	7399	4613	0	772	2934	200	731	631	831	0	35.3	35.1	35.4
5	5500	5546	5454	3048	3048	3048	0.79	933	819	5415	6740	8	2	0	2.4	2.4	0	0	7206	7399	4602	0	772	3706	200	931	831	1031	0	35.5	35.4	35.6
6	5408	5454	5362	3048	3048	3048	0.79	933	819	5326	6724	7.9	2	0	2.4	2.4	0	0	7188	7399	4590	0	772	4477	200	1131	1031	1231	0	35.7	35.6	35.9
7	5317	5362	5271	3048	3048	3048	0.79	933	819	5236	6708	7.8	2	0	2.4	2.4	0	0	7171	7399	4579	0	772	5249	200	1331	1231	1431	0	36	35.9	36.1
8	5225	5271	5180	3048	3048	3048	0.79	933	819	5147	6692	7.7	2	0	2.4	2.4	0	0	7154	7399	4568	0	772	6020	200	1531	1431	1631	0	36.3	36.1	36.4
9	5134	5180	5089	3048	3048	3048	0.79	933	819	5058	6676	7.6	2	0	2.4	2.4	0	0	7137	7399	4558	0	772	6792	200	1731	1631	1831	0	36.5	36.4	36.7
10	5043	5089	4998	3048	3048	3048	0.79	933	819	4970	6660	7.5	2	0	2.3	2.3	0	0	7121	7399	4547	0	772	7563	200	1931	1831	2031	0	36.8	36.7	37

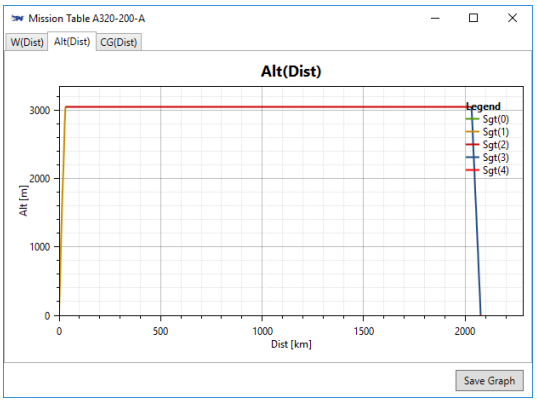


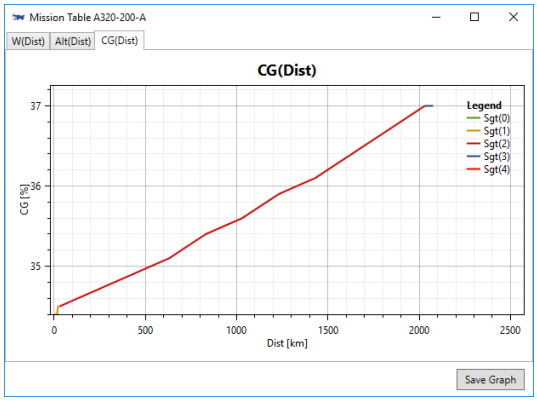
	Mas	Mas	Mas	Alt	Alt0	Alt1	MN	TAS	CAS	L	D	GR	NEO	FPA	AOA	AOP	TED	LED	Treq	Tava	FF	Gear	Time	TTim	Dist	TDis	TDis	TDis	RC	CG	CG0	CG1
1	4998	4998	4998	2896	3048	2744	0.44	516	450	4881	3135	15.6	2	-3.8	3.6	-0.3	0	0	3391	-151.	395	0	33	7965	5	2033	2031	2036	-9.31	37	37	37
2	4998	4998	4997	2592	2744	2440	0.43	508	450	4880	3137	15.6	2	-3.8	3.6	-0.3	0	0	3457	-154	403	0	32	7998	5	2038	2036	2040	-9.38	37	37	37
3	4997	4997	4997	2289	2440	2137	0.42	501	450	4880	3138	15.5	2	-3.9	3.6	-0.3	0	0	3463	-156	410	0	33	8030	5	2043	2040	2045	-9.30	37	37	37
4	4997	4997	4997	1985	2137	1833	0.41	494	450	4879	3140	15.5	2	-3.9	3.6	-0.3	0	0	3469	-158	417	0	33	8063	5	2047	2045	2049	-9.22	37	37	37
5	4996	4997	4996	1681	1833	1529	0.41	487	450	4879	3141	15.5	2	-3.9	3.6	-0.3	0	0	3475	-160	424	0	33	8097	4	2052	2049	2054	-9.13	37	37	37
6	4996	4996	4996	1377	1529	1225	0.4	480	450	4878	3142	15.5	2	-3.9	3.6	-0.3	0	0	3481	-161	431	0	34	8130	4	2056	2054	2058	-9.05	37	37	37
7	4996	4996	4995	1073	1225	921	0.39	473	450	4878	3143	15.5	2	-3.9	3.6	-0.3	0	0	3487	-162	437	0	34	8164	4	2060	2058	2063	-8.96	37	37	37
8	4995	4995	4995	770	921	618	0.38	466	450	4878	3144	15.5	2	-3.9	3.6	-0.3	0	0	3492	-162	444	0	34	8198	4	2065	2063	2067	-8.87	37	37	37
9	4995	4995	4995	466	618	314	0.38	460	450	4877	3145	15.5	2	-3.9	3.6	-0.3	0	0	3498	-162	450	0	35	8233	4	2069	2067	2072	-8.79	37	37	37
10	4994	4995	4994	162	314	10	0.37	453	450	4877	3146	15.5	2	-3.9	3.6	-0.3	0	0	3503	-162	457	0	35	8268	4	2074	2072	2076	-8.70	37	37	37



Show Graph	To Load the graph
Save Table	To Save the table (.txt or .csv file format)



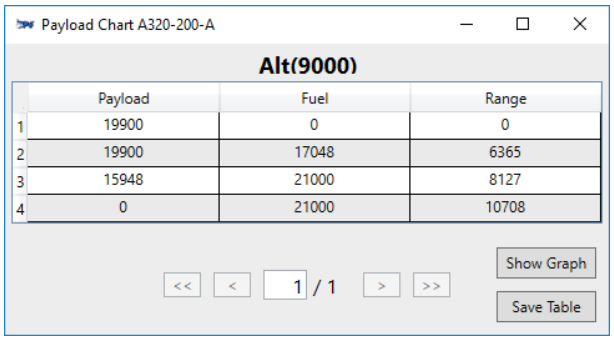




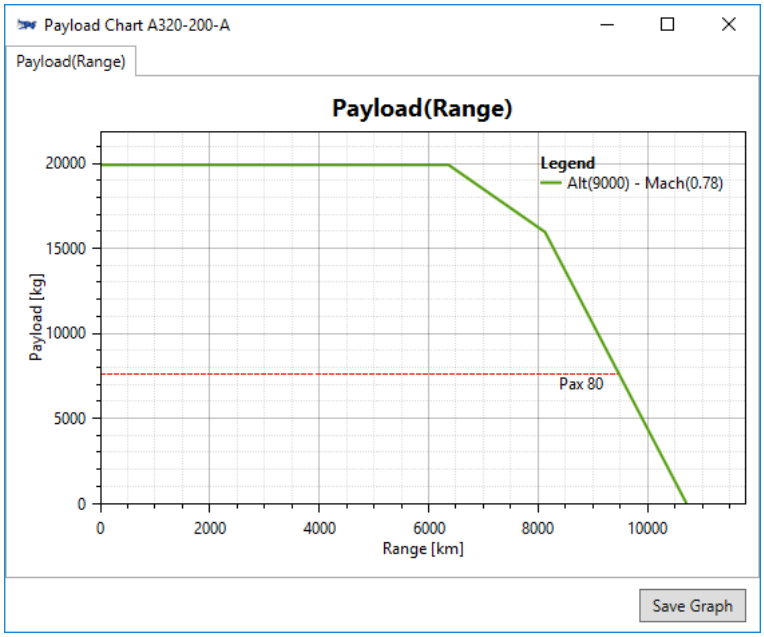
Save Graph	To Save the Graph (.bmp, .pdf, .png or .svg file format)

4.5.5. Payload Chart

Processing/Category: **Specific to Performance Analysis**



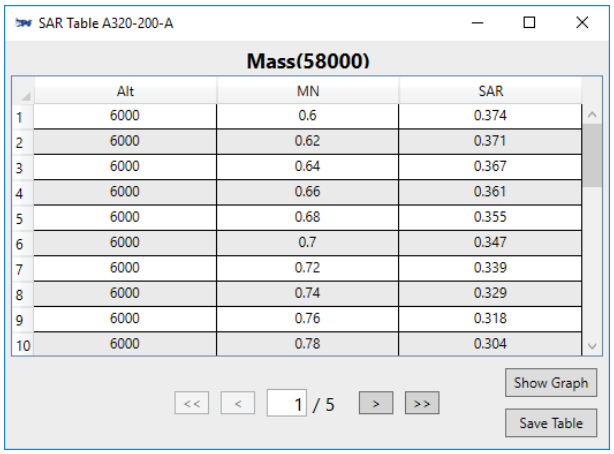
Show Graph	To Load the graph
Save Table	To Save the table (.txt or .csv file format)



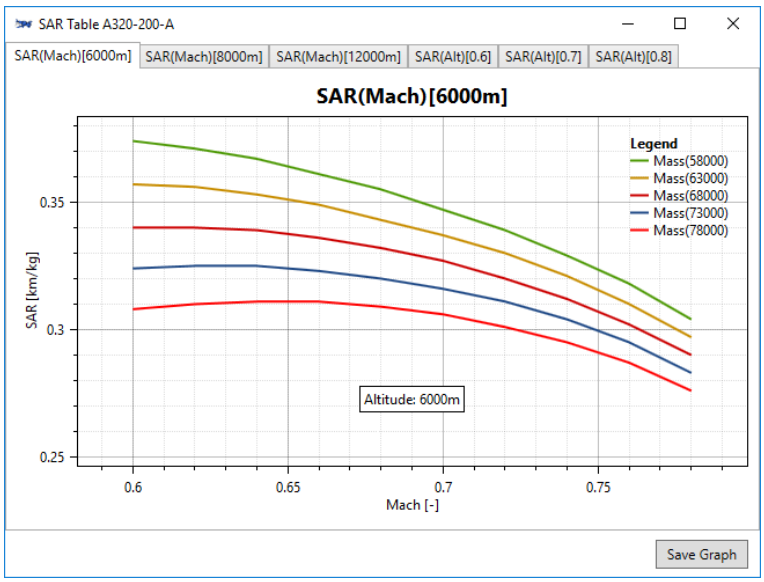
Save Graph	To Save the Graph (.bmp, .pdf, .png or .svg file format)

4.5.6. SAR Table

Processing/Category: **Specific to Performance Analysis / Airliners**



Show Graph	To Load the graph
Save Table	To Save the table (.txt or .csv file format)



Save Graph	To Save the Graph (.bmp, .pdf, .png or .svg file format)

5. Shortcuts

F2	Manage Transparency of the selected component
F3	Manage Solid/Wireframe of the selected component
F5	Refresh the geometry of the selected component
F6	Make invisible the selected component
F7	Make visible all components
F8	Show only on the side view, the MAC and the CGs (computed, theoretical and neutral point)
F10	Hide/Display Main menu