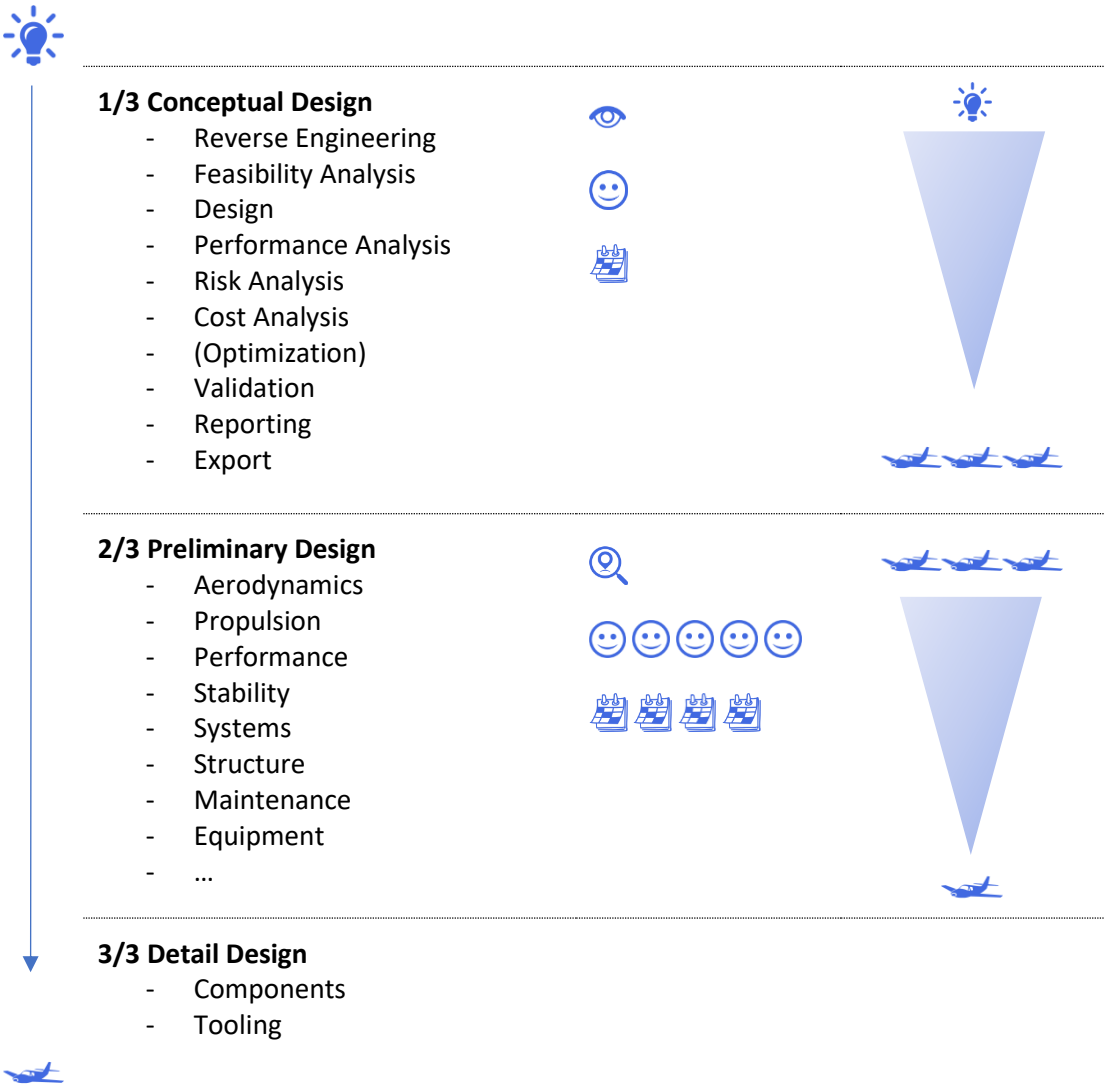
Quick tour around ADS

Aircraft Design Process

ADS performs all the tasks of the Conceptual Design and some of the Preliminary design



1/3 Conceptual Design

- Reverse Engineering
- Feasibility Analysis
- Design
- Performance Analysis
- Risk Analysis
- Cost Analysis
- (Optimization)
- Validation
- Reporting
- Export

2/3 Preliminary Design

- Aerodynamics
- Propulsion
- Performance
- Stability
- Systems
- Structure
- Maintenance
- Equipment
- …

3/3 Detail Design

- Components
- Tooling

Aircraft Design Software

Conceptual Design	Preliminary Design	Detail Design
ADS RDS (Raymer)	**ADS** AAA (DARCorporation) OpenVSP (NASA) VSAero (NASA) PIANO J2 Aircraft …	CAD Software

Why ADS ?

Computation

- Accuracy (cf. validation reports)
- Compilation of the best algorithms
- Includes unique modules: reverse engineering, optimization, validation
- Focused on Conceptual Design (the airplane as a whole)

Use/Support

- User friendly application
- Large number of technical notes accessible directly from the software
- Efficient online technical support
- Customized online training
- Spoken languages: French/English

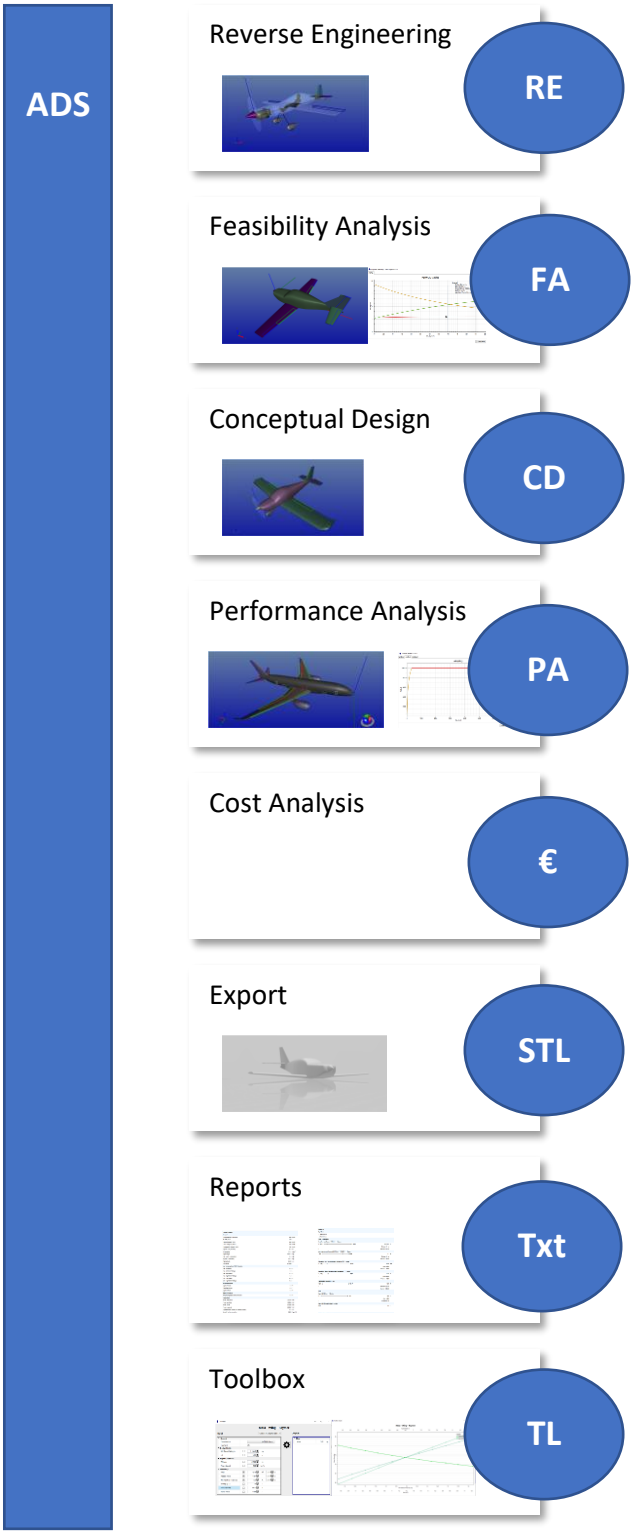
Versions

- Lifetime license
- Driven by the users
- Module-based (customize your own version with exactly what you need, no more)

Costs

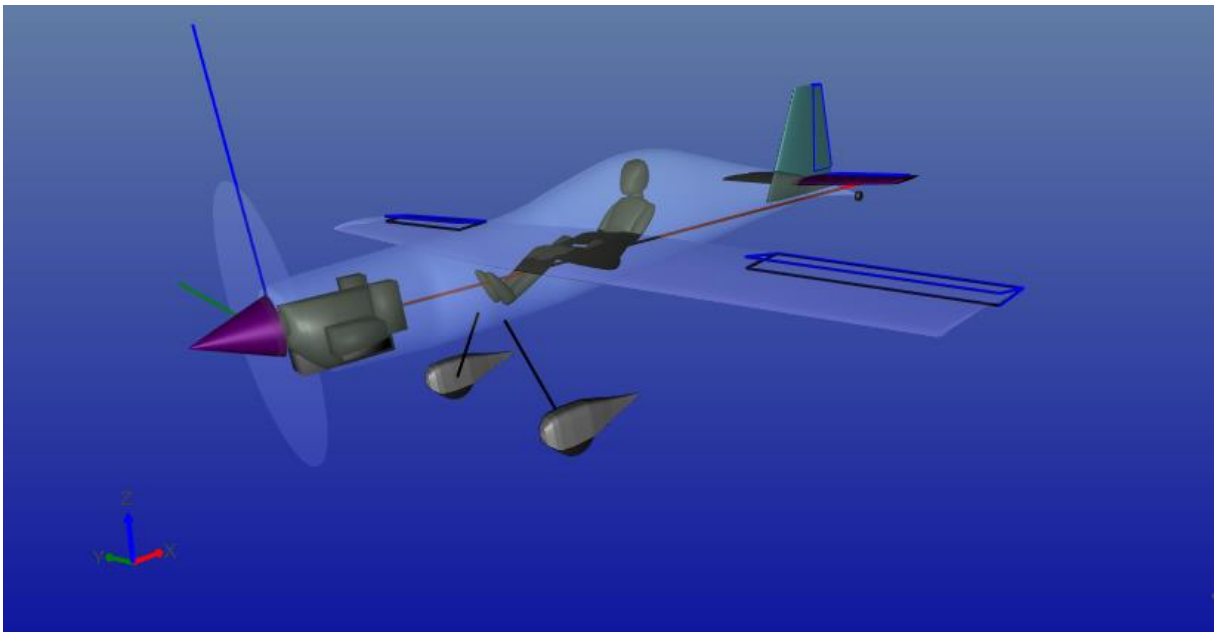
- Affordable
- You pay for what you need (ADS “customized”)
- Reduces drastically the development time and costs

List of the different modules in ADS



RE

Reverse Engineering



Analyze in detail an existing aircraft

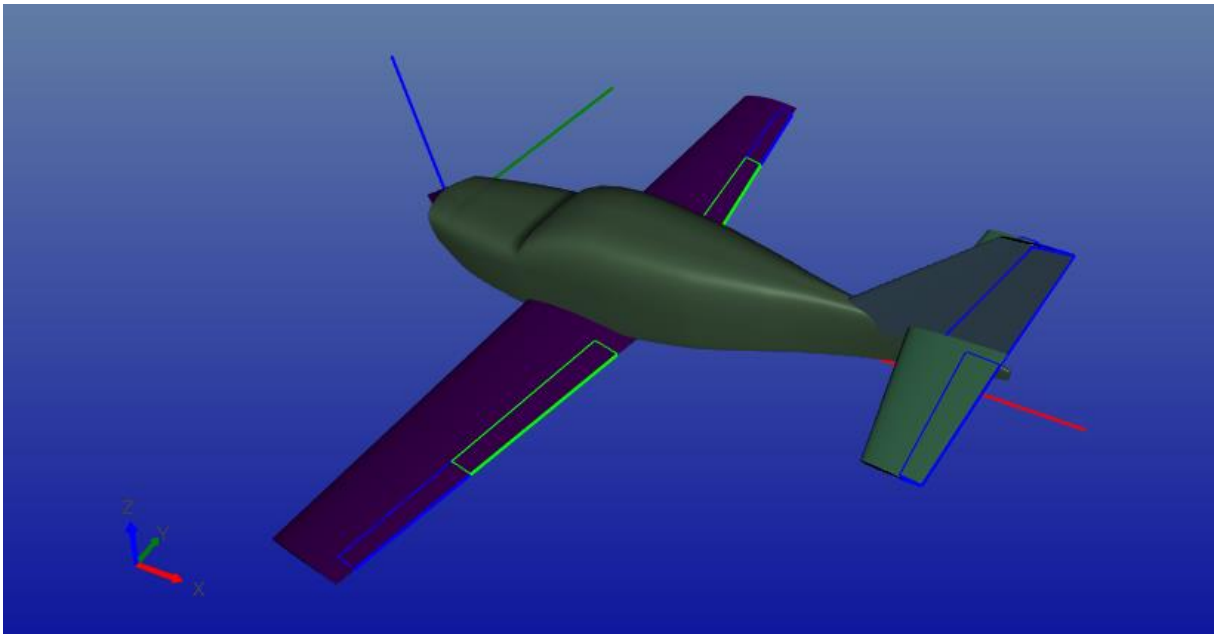
- ➔ Aerodynamic efficiency:
  - Cl_{Mx}
  - Cfe
  - Cd_0
- ➔ Mass efficiency:
  - W_{glider}/W_{MxTO}

Provide priceless information for

- ➔ Engineers:
  - Acquire orders of magnitude to better start the design
  - Acquire orders of magnitude to check the results
- ➔ Salesmen
  - Highlight strengths of the new design
  - Know the weak points of the competitors

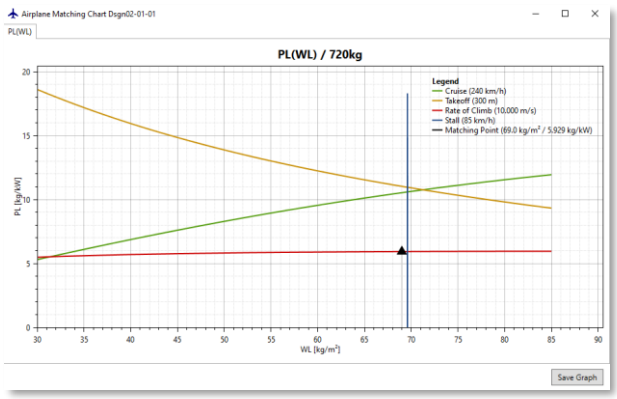
FA

Feasibility Analysis



Check the specifications

- ➔ Validate the numbers
- ➔ Adjust the requirements

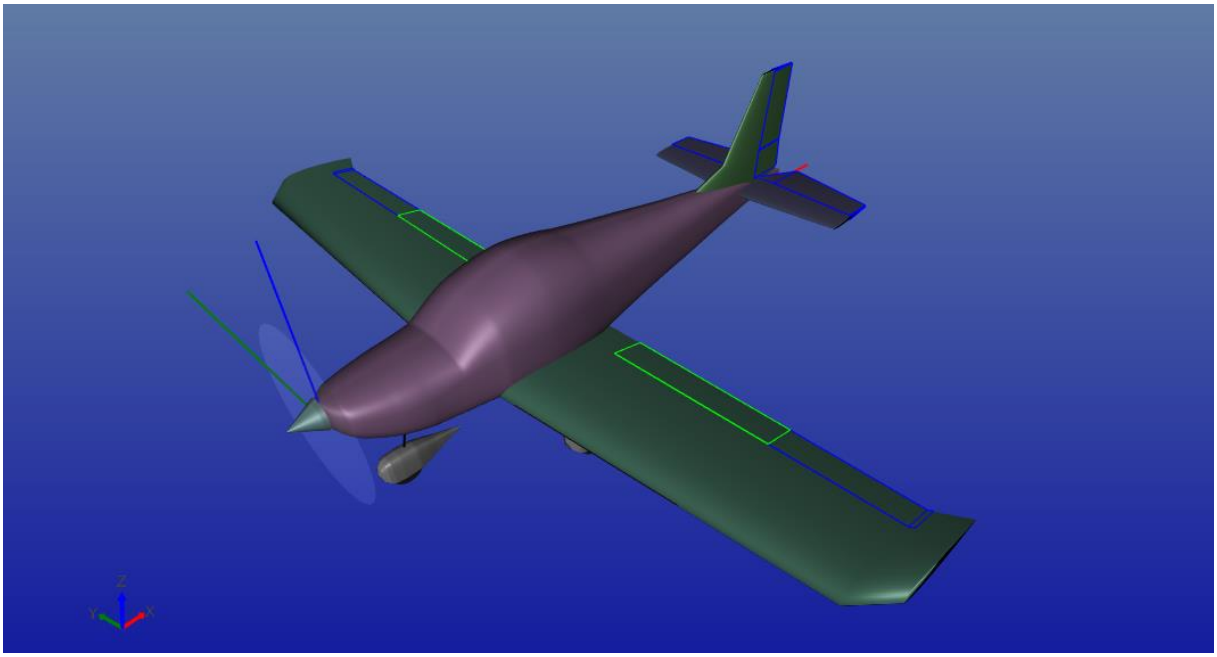


Fix target values for

- ➔ Wing loading
- ➔ Power loading
- ➔ Aerodynamics
- ➔ Mass

CD

Conceptual Design



Reach the **best compromise** to fulfill the requirements

- ➔ Configuration
- ➔ Geometry
- ➔ Powerplant
- ➔ Technical choices

Take into account all internal components and structure

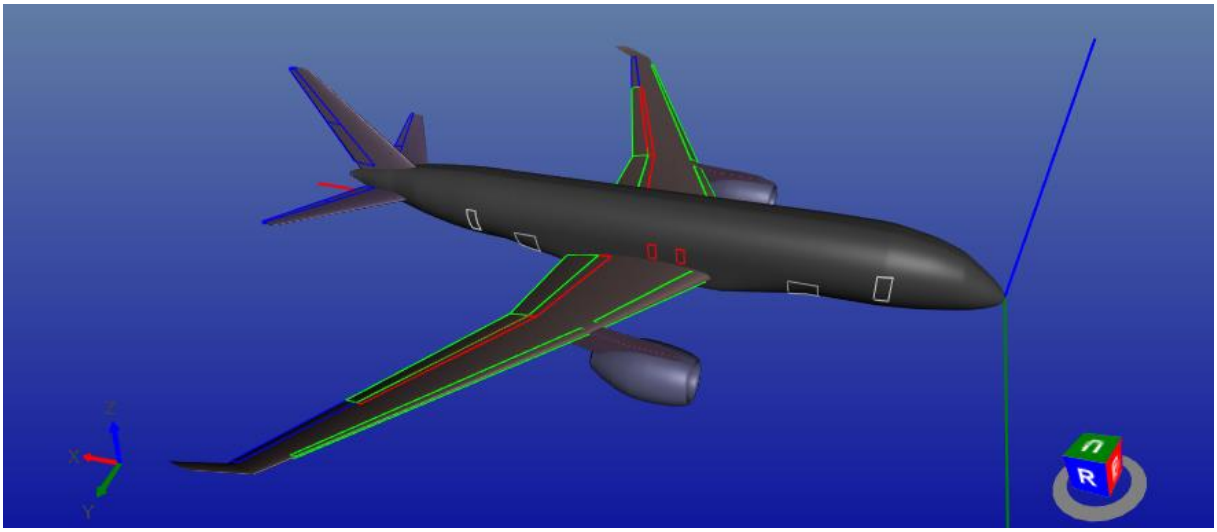
- ➔ Avoid interference between components

Analyze

- ➔ Performance
- ➔ Static and dynamic stability
- ➔ Costs

PA

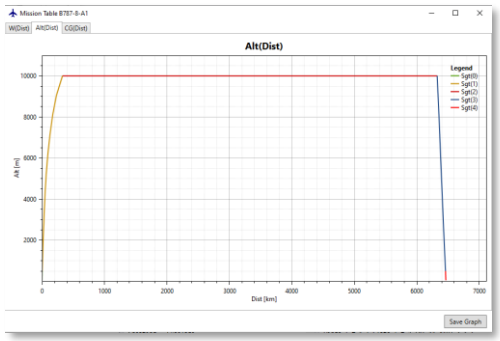
Performance Analysis



1. Compute the performance for different flight conditions
   - ➔ Flight weight
   - ➔ Flight altitude
   - ➔ Power setting
   - ➔ Centre of gravity position

2. Compute the real impact of one modification made on an existing aircraft

3. Anticipate a problem before the problem occurs
   - ➔ Prepare actions
   - ➔ Fix limits

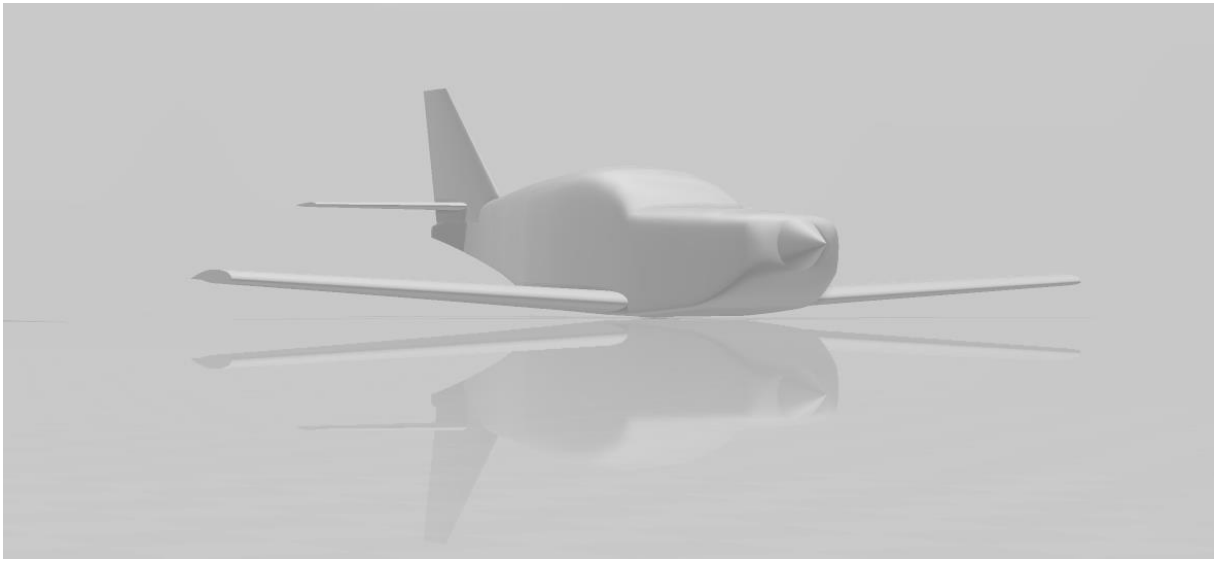


Cost Analysis

More than 90% of the development cost are function of the decisions taken during the Conceptual Design. All the technical choices have an impact on the cost

- ➔ Research & Development
- ➔ Manufacturing
- ➔ Operating
- ➔ Market price
- ➔ Breakeven Point

STL Export

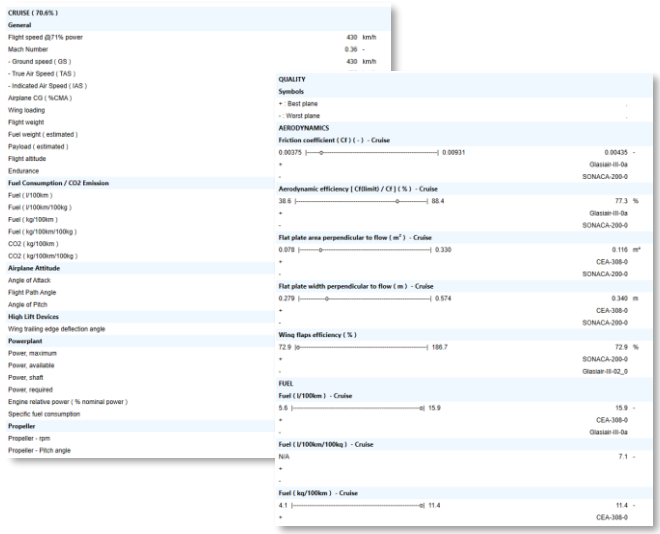


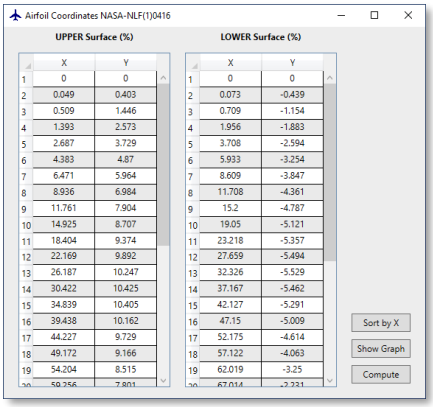
The 3D-Model may be exported in stl file format

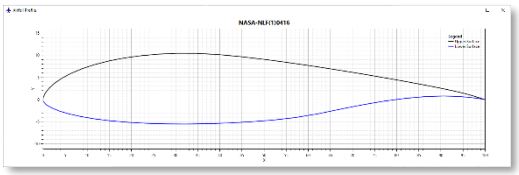
- ➔ CAD software
- ➔ CFD Analysis
- ➔ 3D-Printers

BDF file format is generated in order to perform structural analysis in **Patran/Nastran**

Txt Reports







Results may be exported in

- ➔ .txt
- ➔ .docx

Tables may be exported in

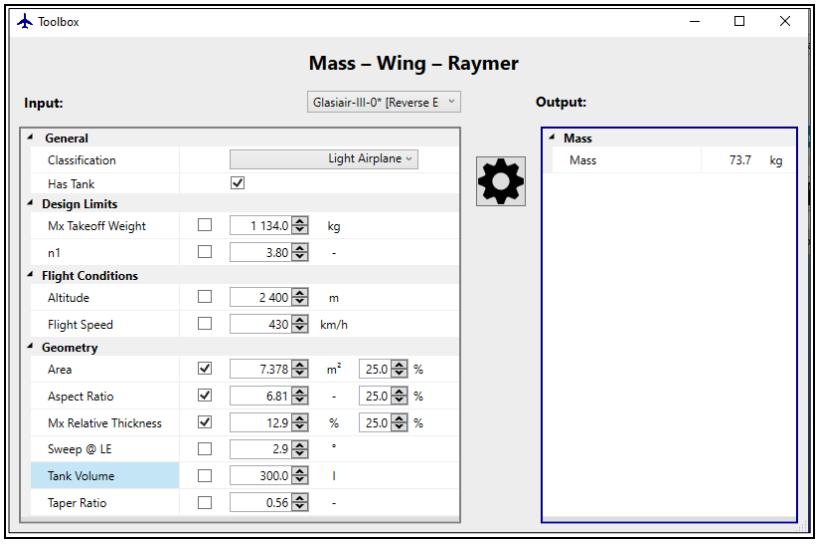
- ➔ .csv
- ➔ .txt

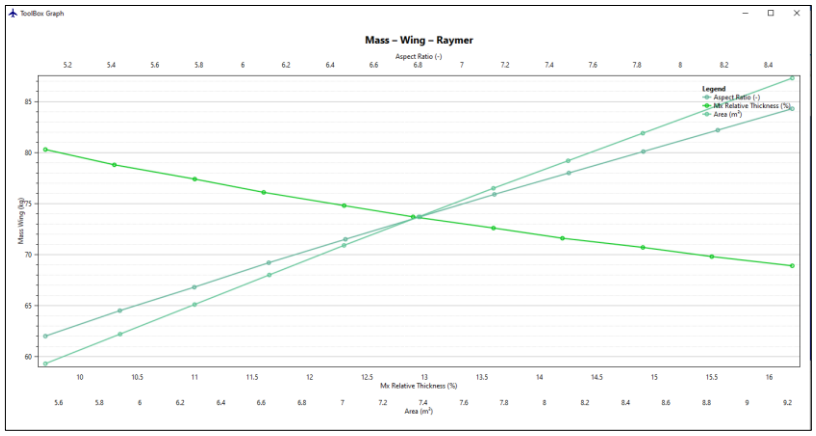
Graphs may be exported in

- ➔ .bmp
- ➔ .pdf
- ➔ .png
- ➔ .svg

TL

Toolbox…





… in which equations are explained graphically.

And in addition

Some database

- ➔ Aircraft
- ➔ Engine
- ➔ Airfoil
- ➔ Materials
- ➔ Batteries
- ➔ Tires
- ➔ Fuel
- ➔ Regulation

Link with other software

- ➔ XFoil
- ➔ DFDC

Large number of Technical Notes written to be used during the Conceptual Design

Reference

- ➔ Academic & Scientific publications
- ➔ USAF DATCOM
- ➔ Roskam
- ➔ Raymer
- ➔ Torenbeek
- ➔ …