11. Statistics

11.1 Introduction

The **Statistics** module makes it possible to make an immediate analysis of the existing aircraft.

During the design process and more particularly during the conceptual design, this analysis is essential to:

-   Assess the current state of the art and compare the developing product with its direct and indirect competitors and

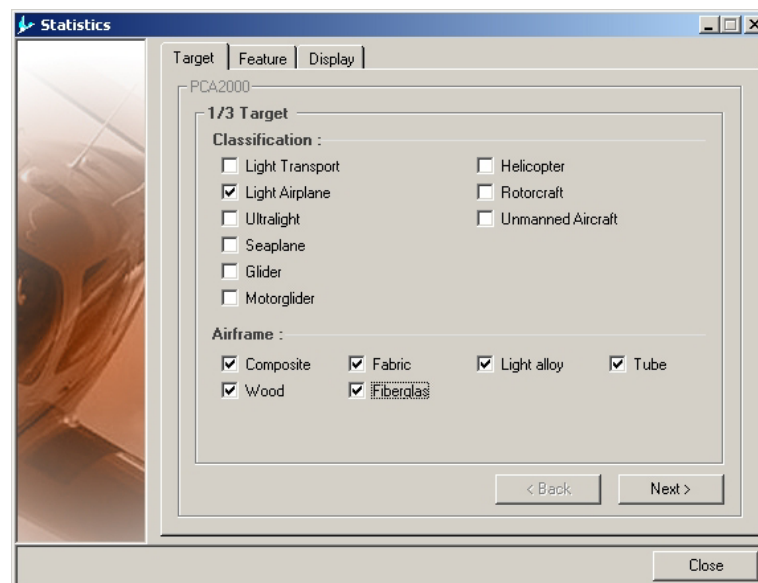-   Start the design process in a quick and efficient way by determining realistic orders of magnitude.

Figure 11.1 : The Statistics module

11.2   Table of content

11.3   Definition of the statistical analysis

To access the Statistics module, **click** on [**Analysis**] then [**Statistics**] in the menu bar in the main window. You can also access it directly by clicking on [icon] in the vertical toolbar.

The definition of the statistical analysis is carried out in 3 steps:

- Step 1: definition of the target.
- Step 2: definition of the analysis criteria.
- Step 3: definition of the results display options.

The analysis criterion is determined by one or two variables.

11.3.1 Step 1: definition of the target

11.3.1.1 Introduction

The target is determined on the one hand by the selection of one or more aircraft categories and, on the other hand, by the selection of one or several construction modes.

The various categories proposed are:

- Light transport plane	-	Light aircraft
- Ultra light aircraft	-	Seaplane
- Glider	-	Powered glider
- Helicopter	-	Gyroplane
- Drone	-	

The various construction modes proposed are:

- Composite	-	Fabric
- Light alloy	-	Tube
- Wood	-	Fiber glass

A target determined by the choice of the category [Light aircraft] and the choice of the building mode [Composite] implies that the light aircraft of composite construction only will be analyzed.

11.3.1.2 Definition of the target

1. **Select** one or several aircraft categories amongst the ones that are proposed to you.

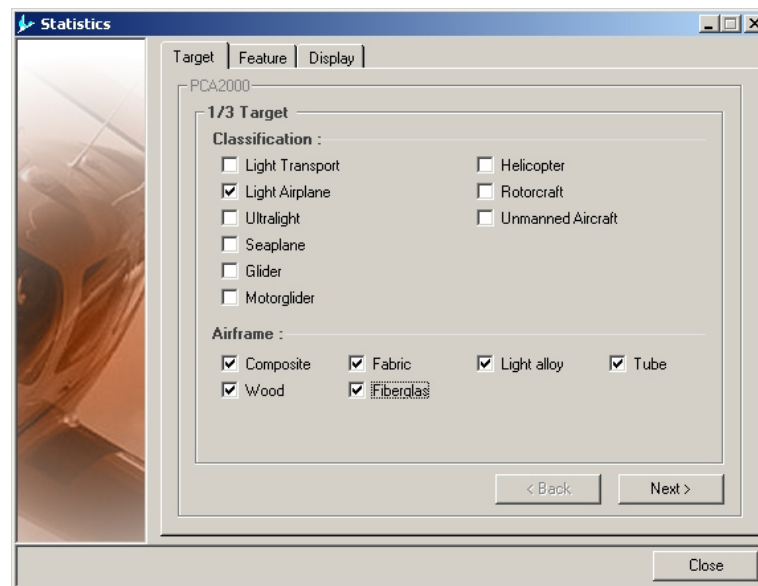2. **Select** one or several construction modes.

3. **Click** on [Next >] to go on.

Figure 11.2 : Definition of the target

11.3.2 Phase 2: definition of the analysis criteria

11.3.2.1 Introduction

The analysis criterion is determined by one or two variables.
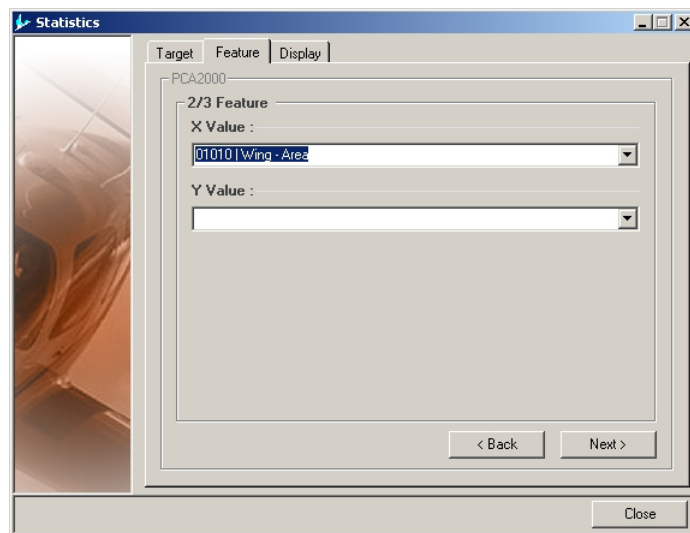

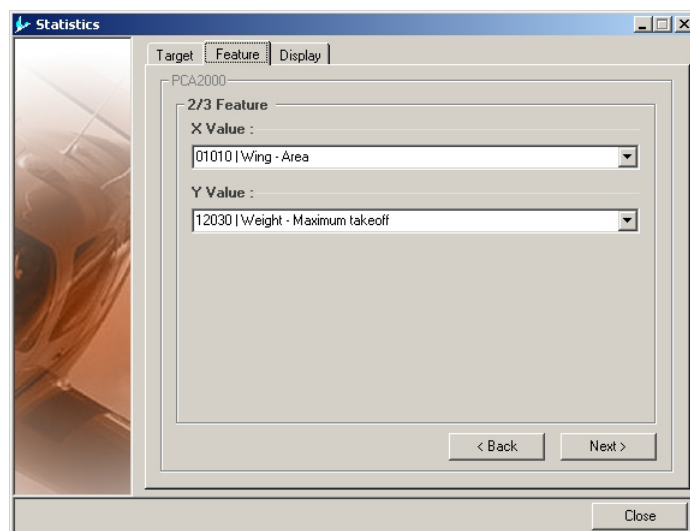**Figure 11.3 : Definition of the analysis criteria (1 variable)**

Figure 11.4 : Definition of the analysis criteria (2 variables)

11.3.2.2 Definition of the analysis criterion

1. **Select** one or two variables amongst the ones proposed to you.

2. **Click** on [Next >] to go on.

11.3.3 Step 3: definition of the results display options

11.3.3.1 Introduction

The results display order in the table can be:

-	Alphabetical	-	Increasing in relation with X
-	Increasing in relation with Y	-	Decreasing in relation with X
-	Decreasing in relation with Y		

Various statistics can appear on the graphic:

-	Minimum value in X	-	Maximum value in X
-	Average value in X	-	Minimum value in Y
-	Maximum value in Y	-	Average value in Y

11.3.3.2 Definition of the display options

1. **Select** the results display order in the table amongst the various options proposed to you.

2. **Select** the statistics that you wish to see displayed on the graphic amongst the ones which are proposed to you.

3. **Click** on Compute to run the statistical analysis.
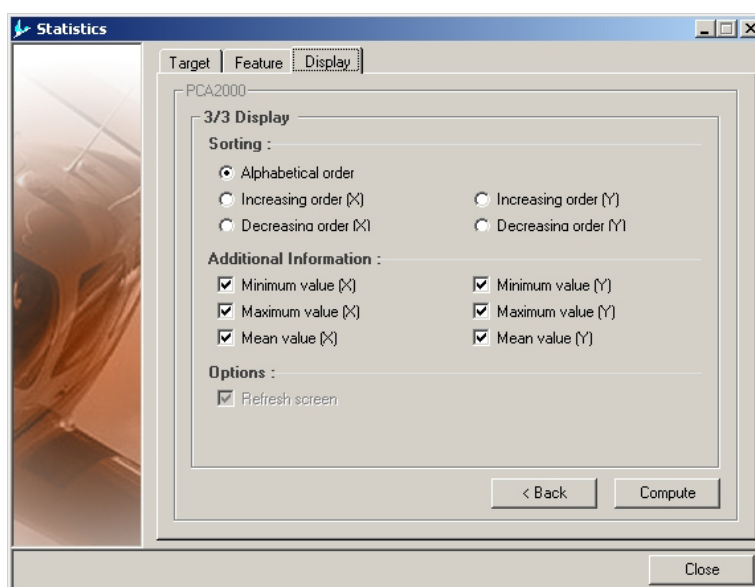

Figure 11.5 : Definition of the display options
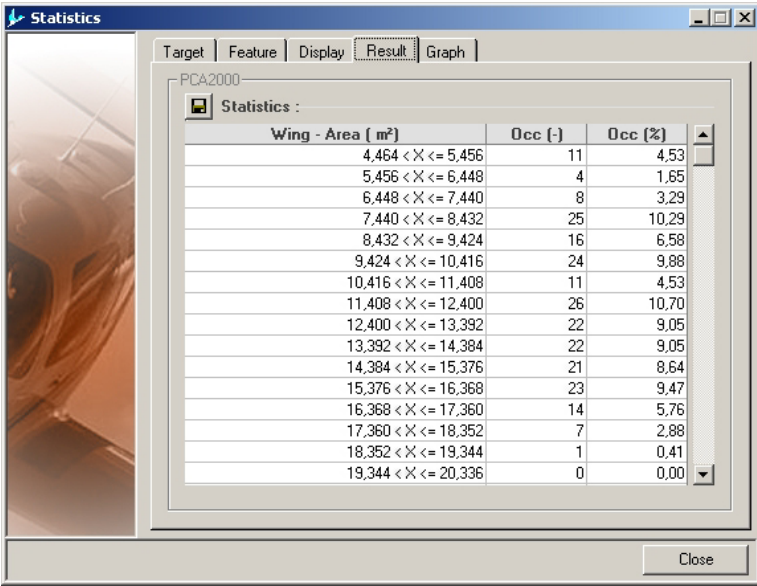
11.4 Visualization of the results

The statistical analysis result is displayed both on the table and the graphic.

11.4.1.1 Analysis criteria with one variable

The result of this statistical analysis shows the number of occurrences for a given value of the selected variable in the sample analyzed.

The results table is structured in the following way:

Column 1 :	Group of the intervals of values determined by the selected variable.
Column 2 :	Number of occurrences for a given value of the selected variable included in the corresponding interval.
Column 3 :	Number of occurrences for a given value of the selected variable included in the corresponding interval brought back to the total number of occurrences.

Figure 11.6 : Results of an analysis with 1 variable

Click on 💾 to save the table content in a .csv file that you will be able to open with any spreadsheet program such as Excel for example.

A message appears in the comments display area to inform you about the saving status.

> 💡
>
> The .csv file is saved in the folder **Exports** of the main folder **PCA2000-Data**
>
> The name of the .csv file is defined Stat1D_ + number of the selected variable + .csv (for example Stat1D_01010.csv). If a file with the same name already exists, it is named with a running number between brackets (for example Stat1D_01010(1).csv).

The graphic representation of the results is a histogram.

- The X axis corresponds to the various values of the analyzed variable.
- The Y axis corresponds to the number of occurrences for a given value of the variable selected in a given sample.
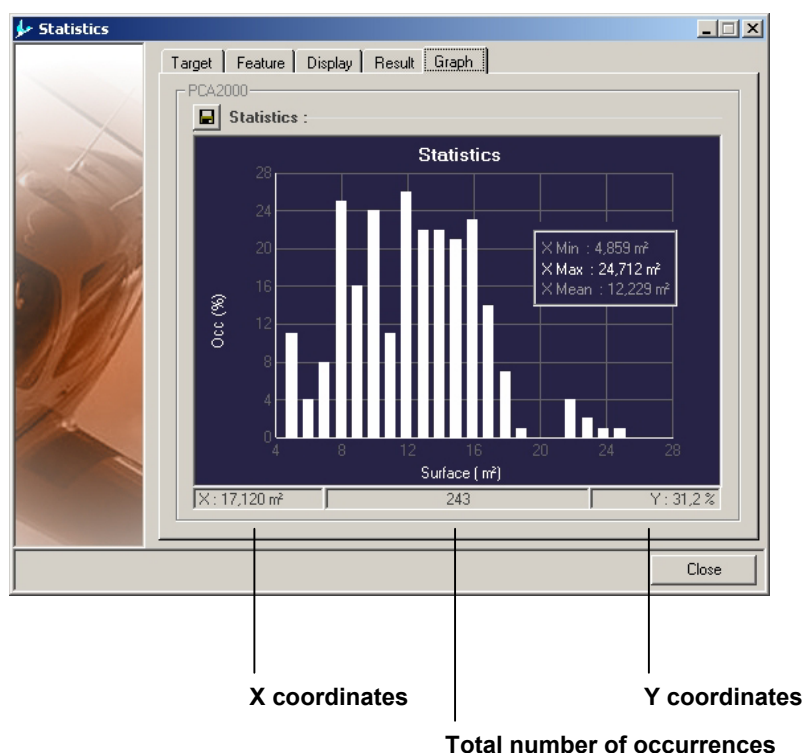

X coordinates

Total number of occurrences

Y coordinates

Figure 11.7 : Histogram

Click on 🖫 to save the graphic in two image files (.bmp and .jpg)

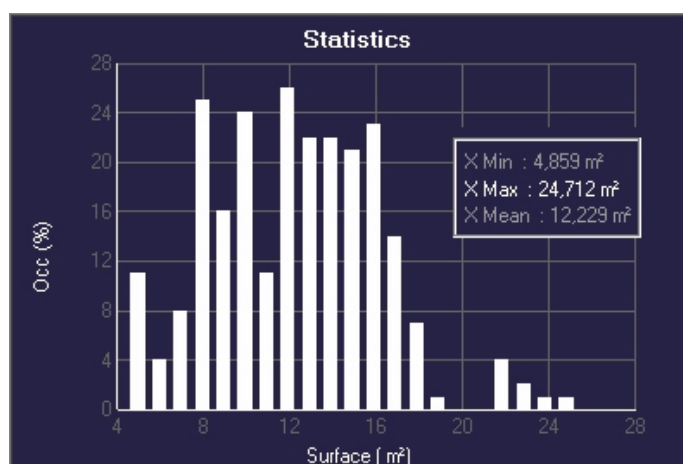A message appears in the comments display area to inform you about the saving status.

Figure 11.8 : Image saved

💡

The image files are saved under the folder **Exports** of the main folder **PCA2000-Data**

The name of the image file is defined Stat1D_ + number of the selected variable + .bmp or .jpg (for example Stat1D_01010.jpg). If a file with the same name already exists, it is named with a running number between brackets (for example Stat1D_01010(1).jpg).

💡

When you move the pointer of the mouse on the graphic, the coordinates of the position of the pointer are displayed in the 2 areas located under the graphic. The middle area displays the total number of occurrences.

💡

Use the **arrows** ← → ↑ ↓ of the keyboard to move precisely the pointer of the mouse.

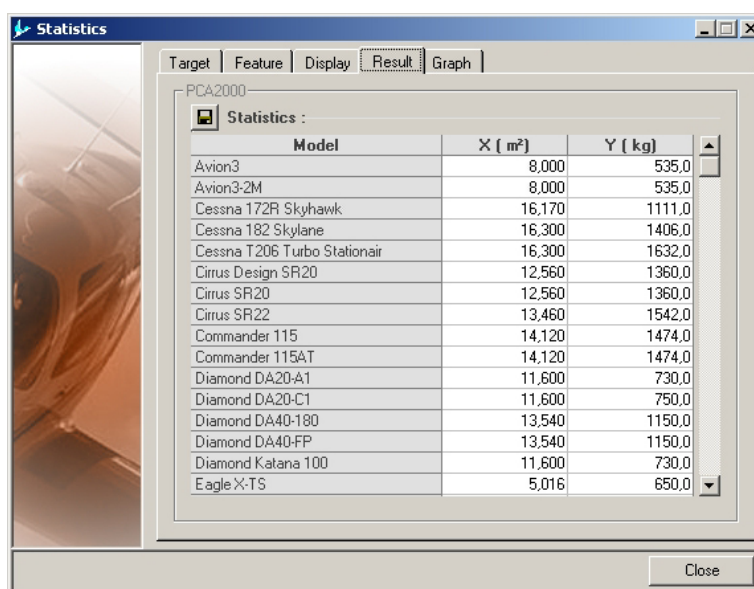11.4.1.2 Analysis criteria with two variables

The result of this statistical analysis indicates the degree of correlation between the two selected variables.

The results table is structured in the following way:

Column 1:	Group of the aircrafts belonging to the analyzed sample.
Column 2:	Value of the first corresponding variable.
Column 3:	Value of the second corresponding variable.

Figure 11.9 : Result of an analysis with 2 variables

Click on 🖫 to save the table content in a file .csv file that you can open with any spreadsheet program such as Excel for example.

A message appears in the comments display area to inform you about the saving status.

The .csv file is saved in the folder **Exports** of the main folder **PCA2000-Data**

The name of the .csv file is defined Stat2D_ + number of the first selected variable + number of the second selected variable + .csv (for example Stat2D_01010_12030.csv). If a file with the same name already exists, it is named with a running number between brackets (for example Stat2D_01010_12030 (1).csv).

The graphic representation of the results is a scatter diagram.

- The X axis corresponds to the various values of the first selected variable.
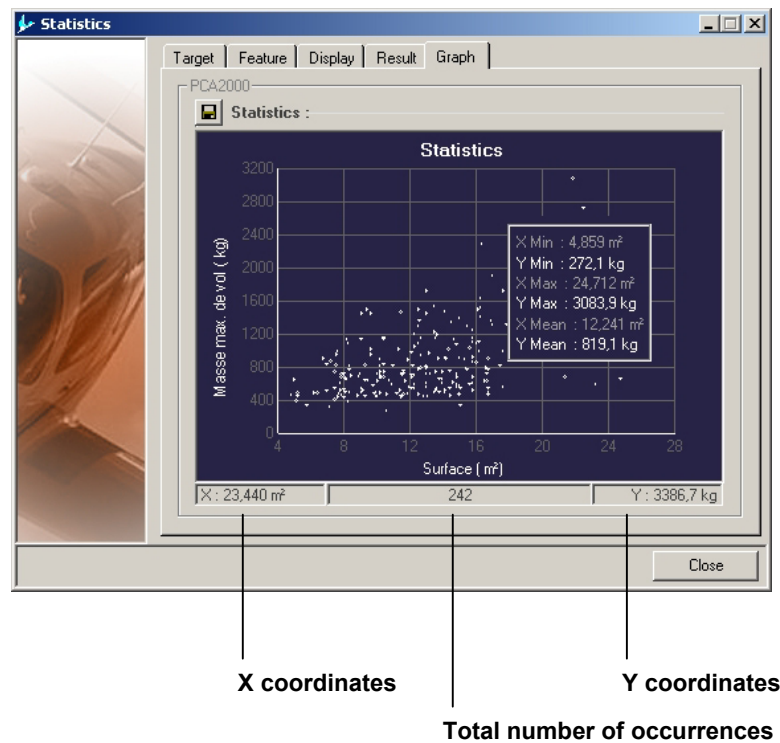- The Y axis corresponds to the various values of the second selected variable.

Figure 11.10 : Scatter diagram

Click on ![save icon] to save the graphic in two image files (.bmp and .jpg)
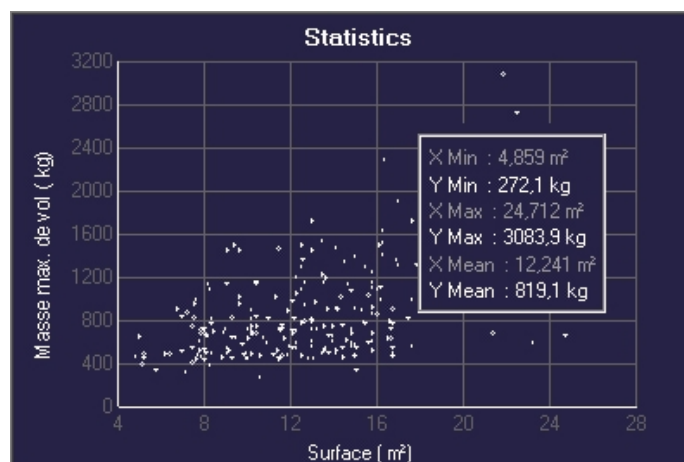

Figure 11.11 : Saved image

The image files are saved under the folder **Exports** of the main folder **PCA2000-Data**

The name of the image file is defined Stat2D_ + number of the first selected variable + number of the second selected variable + .bmp or .jpg (for example Stat2D_01010_12030.jpg). If a file with the same name already exists, it is named with a running number between brackets (for example Stat1D_01010_12030 (1).jpg).

When you move the pointer of the mouse on the graphic, the coordinates of the position of the pointer are displayed in the 2 areas located under the graphic. The middle area displays the total number of occurrences.

Use the **arrows ← → ↑ ↓** of the keyboard to move precisely the pointer of the mouse.

When the pointer of the mouse arrives near a point, the name of the corresponding aircraft is displayed on the graphic.

11.5   Localization of the data file

If the data folder **PCA2000-Data** has not been localized yet on the computer disk or if that information has been « lost », you must define, before you make the statistical analysis, the location of that folder on the disk. In order to do that:

1. **Look for** the location of the data folder **PCA2000-Data**
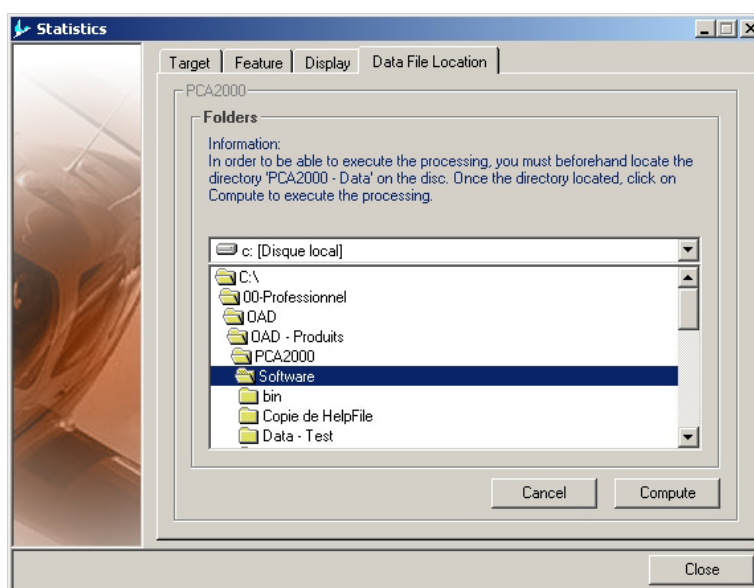
2. **Select** PCA2000-Data with a double click with left button of the mouse.

Figure 11.12 : Localization of the data file