6 Optimized design

6.1 Introduction

While making the conceptual study of a new product, it is important to plan as many solutions as possible to be able, in the end, to keep the best one, i.e. the one that responds in an optimal way to the specifications requirements.

PCA2000 offers a specific module to carry out this optimization. In order to do that, the user has to specify the variables that he wishes to make vary from a lower limit to an upper limit as well as the variation pitch. Each data set corresponds to an aircraft with a given configuration. The current software version enables to connect automatically up to 10,000 different configurations.

Given the fact that there are so many results and in order to facilitate their analyses, the user can also determine some limits so that only the results that fit within those limits will be taken into consideration. Those limits are determined, most of the time, through an in-depth analysis of the existing airplanes (cf. statistical analysis module).

Once the optimized design is finished, only a limited number, more or less ten various configurations will remain. The user will go to the next design step where he will determine in a more precise way the input data and will look at the other flight phases (cf. level 2 design)

6.2   Table of content

6.3 Description

If your license allows it, once you are in the Options window, you have the possibility to make an optimized design. In order to do that, **click** on the option button called **Optimized design**.
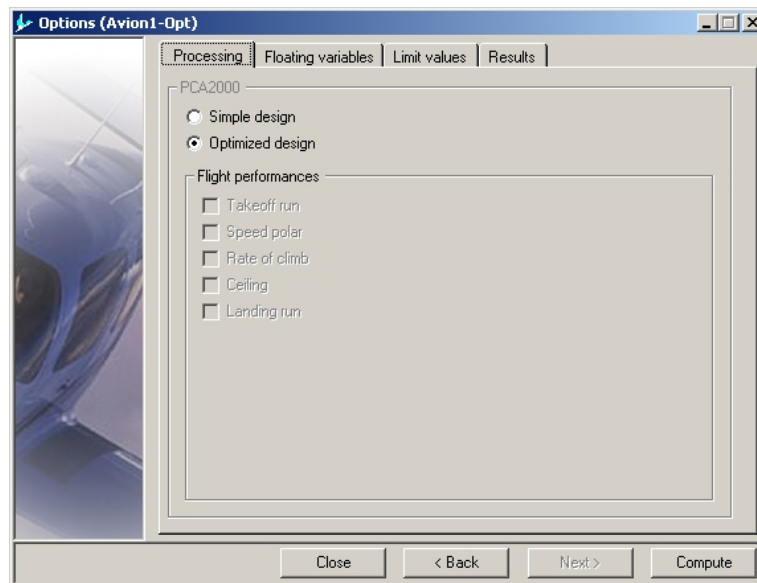
Three new tabs become accessible.

Figure 6.1 : Optimized design

In order to make an optimized design:

1. **Determine** the moving variables

2. **Determine** the limits so that **only** the results that fit within them will be taken into consideration (facultative).

3. **Determine** the results that you wish to see displayed

6.3.1   Definitions of the moving variables

The definition of the moving variables is done simply by selecting items in a drop-down list. It is possible for you to choose up to 15 moving variables simultaneously.
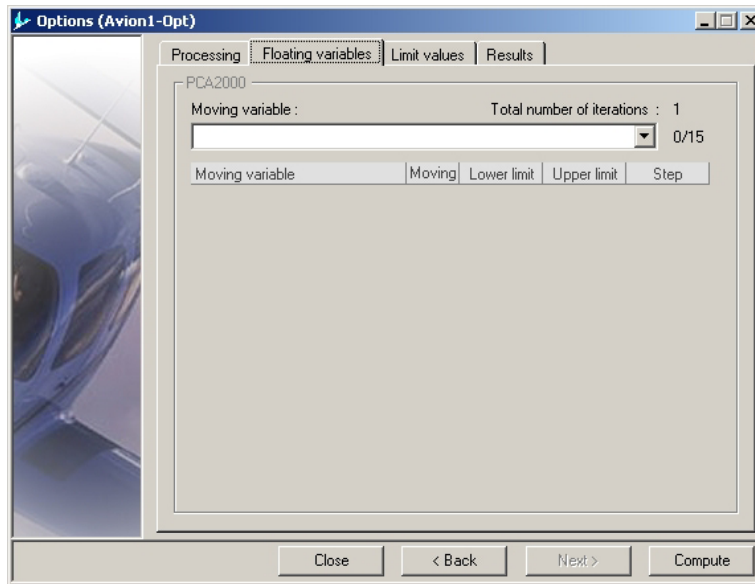

Figure 6.2 : Optimized design (moving variables)

Once the moving variable has been selected, the user must determine the limits within which the variable will evolve, from a given lower limit to a given upper limit with a given variation pitch. The total number of iterations is automatically calculated and displayed on the upper right corner of the drop-down list. The current software version limits the maximum number of iterations to 10,000.
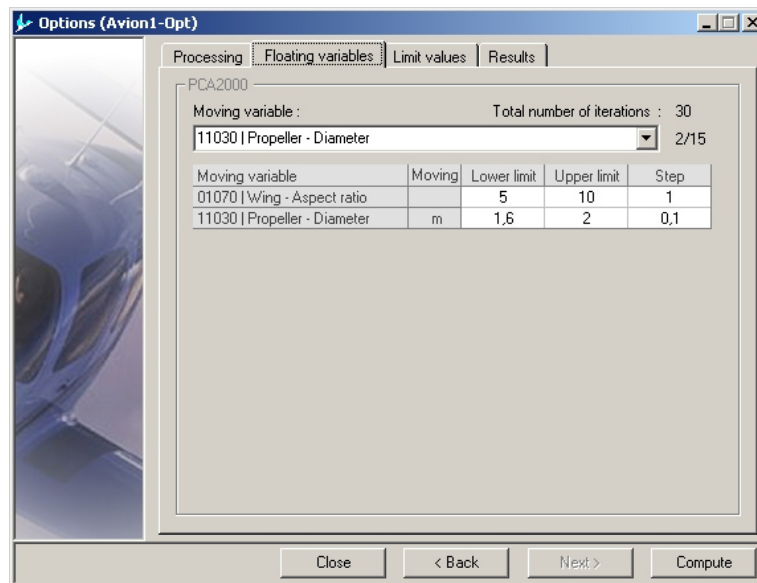
Figure 6.3 : Optimized design (selection of the moving variables)

Once the moving variables are determined, the user can go to the next step that consists in determining the limits so that only the results within it will be taken into consideration.

6.3.2   Definition of the limits (facultative)

The definition of the limits is done simply by selecting items in a drop-down list. It is possible for you to choose maximum 15 of them simultaneously.
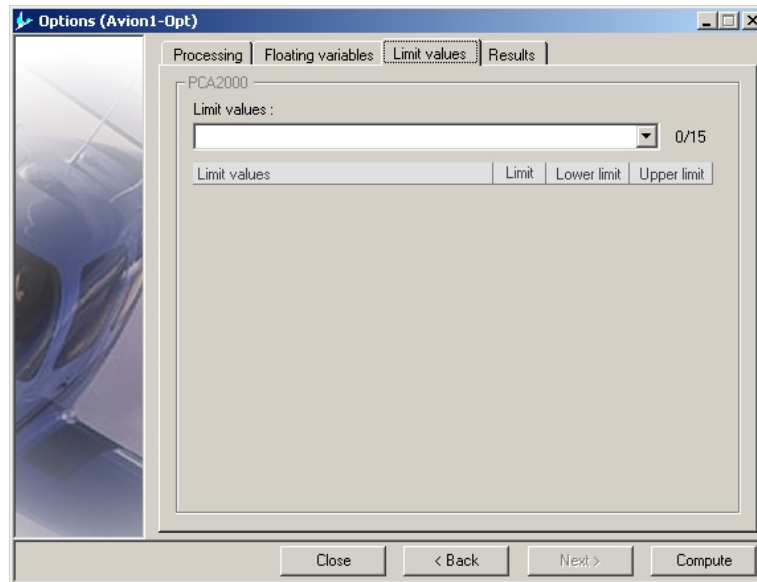

Figure 6.4 : Optimized design (limits)

Once the limit variable has been selected, the user must determine the limits. We advise to proceed with an analysis of the existing airplanes to determine in a realistic way the lower and upper limits.
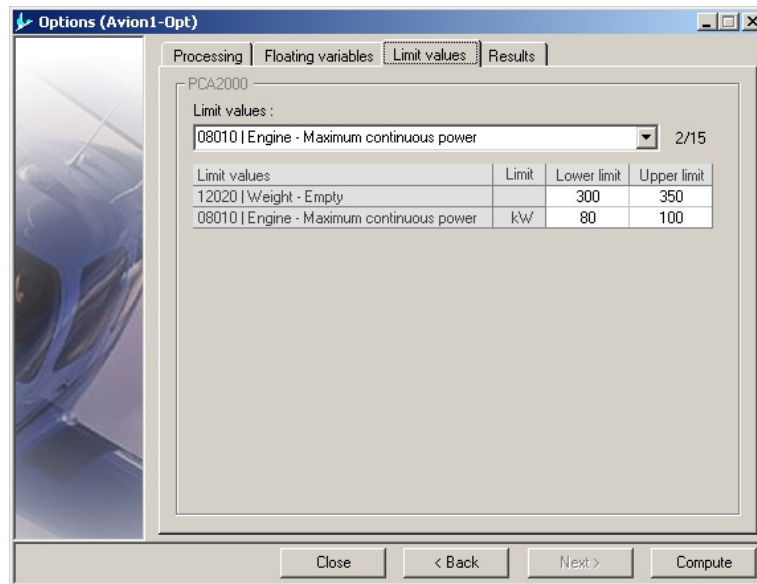
Figure 6.5 : Optimized design (limits selection)

While looking at the above example, only the configurations which have as result an empty weight between 350kg and 450kg are retained. The other configurations will be automatically deleted from the results sets.

Once the limits are determined, the user can go to the next step that consists in determining the results that he wishes to see displayed.

6.3.3 Definition of the results to display

The definition of the results to display is done simply by selecting items in a drop-down list. It is possible for you to choose maximum 99 of them simultaneously.

The control button ▥ allows you to select simultaneously all the items of the drop-down list.

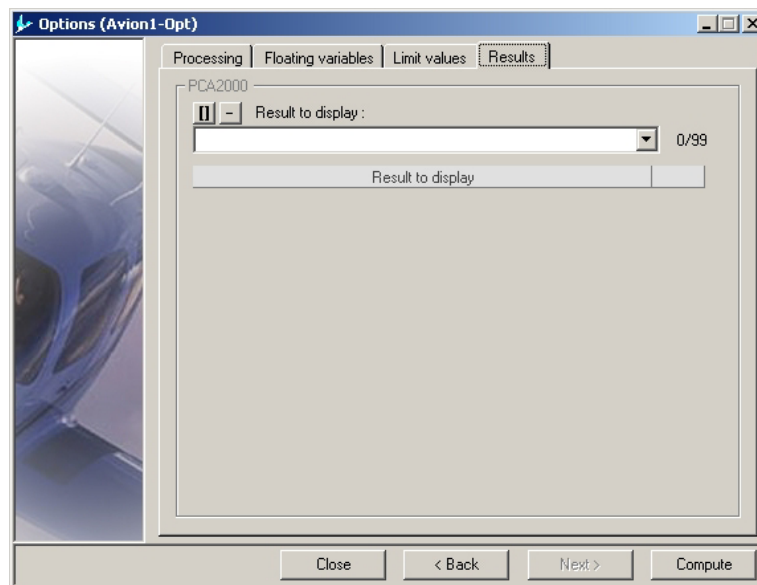The control button ▭ allows you to delete all the items from the results grid.

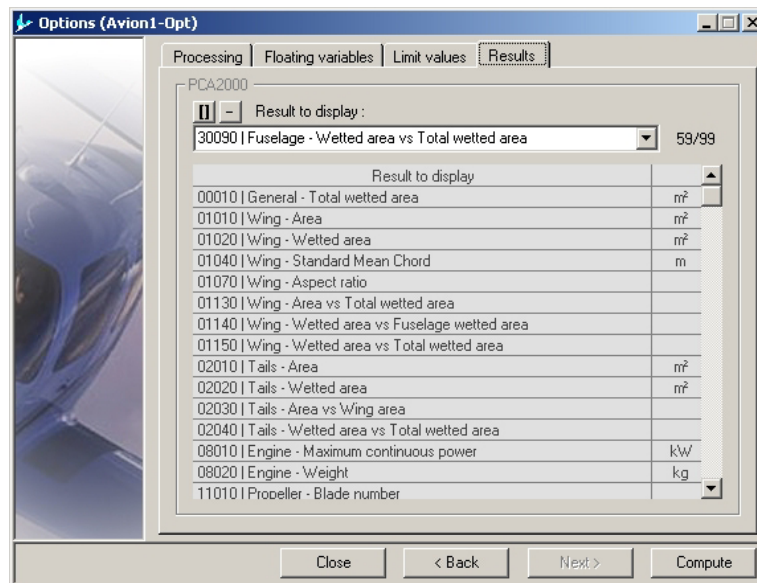**Figure 6.6 : Optimized design (results)**

Figure 6.7 : Optimized design (results selection)

6.3.4 Calculations

To make the calculations, click on [Compute] that appears in each data acquisition window.

If the data is missing a warning message will appear on the screen, then, the acquisition window that contains the blank cell is also displayed on the screen and the cursor is positioned in the blank cell.
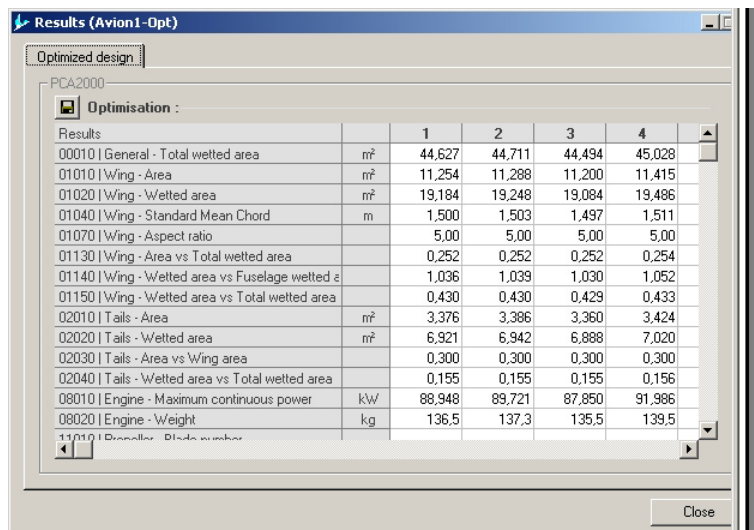

In order to obtain detailed information concerning the algorithms used during the design process, we invite you to consult the technical notes available on the PCA2000 website.

6.3.5   Results

6.3.5.1   Display of the results

Once the calculations are made, the results window is automatically displayed. The number of configurations foreseen as well as the number of configurations accepted is displayed in the comments display zone of the main window.

Figure 6.8 : Optimized design (results display)

6.3.5.2   Saving the content of the results table

To save the content of the display area, **click** on the control button 🖫 located on top of the table on the left of Optimization.

A message is displayed in the comments display area to inform you about the recording status.

> 💡
>
> The file is saved as a text file (format .csv) that you can open with any spreadsheet program such as Excel for example.

6.3.5.3 Print the results

To print the design results, **click** on the control button 🖨 of the toolbar of the main window.
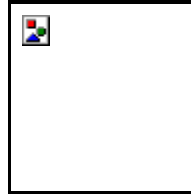

Figure 6.9 : Optimized design (printing of the results)