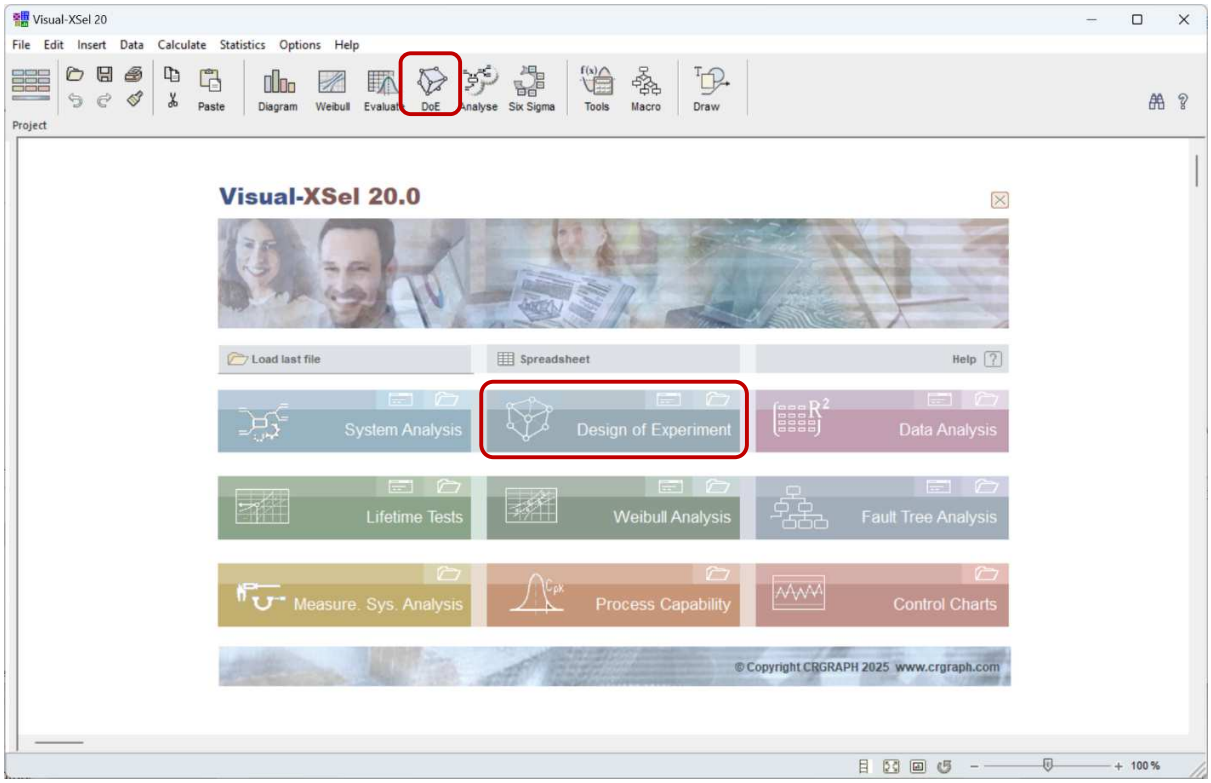
Introduction

Visual-XSel is both, a powerful software to create a DoE (Design of Experiment) as well as to evaluate the results, or historical data. After starting the software, the main guide shows the direct access to the important functionality. Above the item Statistical Experiments, there is the System Analysis. It is possible with this method to find out the important factors for a DoE, by using mind maps.



More information to the statistical background one can find under:
www.weibull.de/COM/Statistics.pdf

To use the System Analysis, please have a look to:
www.weibull.de/COM/System_Analysis.pdf

If you first join the program, it is recommended to use always the main guide (select the menu item ***File / New*** if the guide is not visible). Later one can use also the menu ***Statistics*** or the icons below.

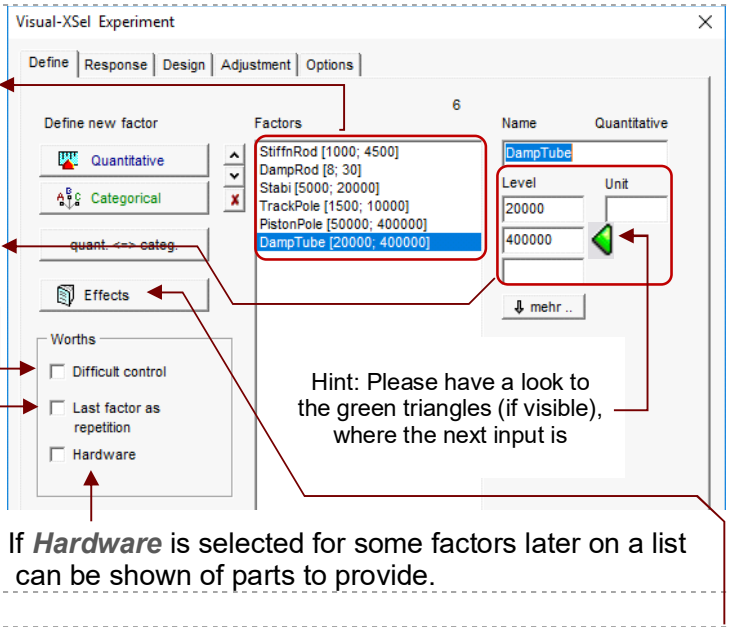
Please ask for a test version via info@crgraph.de

On the following pages the most important steps are shown. First use the ***Statistical Experiments*** from the Main-Guide

The first step to create a DoE is to define the Factors (parameter). Push the button ***Quantitative*** for continuing measurable factors, or ***Categorical*** for factors described by text. The names should not be longer than 20 chars.

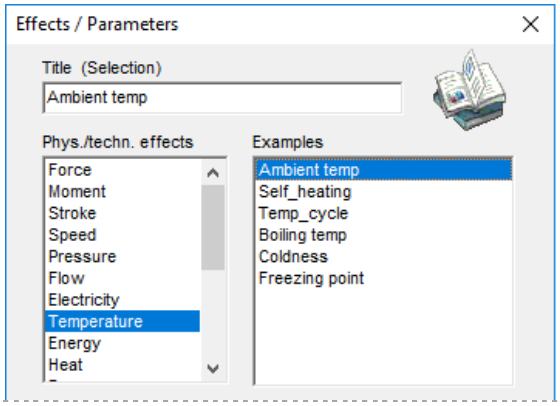
Type for each factor the ***levels*** of the combinations and use optional a ***Unit***.

If ***Difficult control*** is selected the order of the experiments is created with as few changes as possible are necessary.
The option ***Last factor as***.. means, that the combinations of all factors before will repeated depending on there levels.



If ***Hardware*** is selected for some factors later on a list can be shown of parts to provide.

Under the button ***Effects*** a little library of the most important physically effects is available. Own factors can be added here. Use a double click to use a selected item, which is then shown in the Title.
This library is also a good check-list, so that no factor is forgotten in your project.



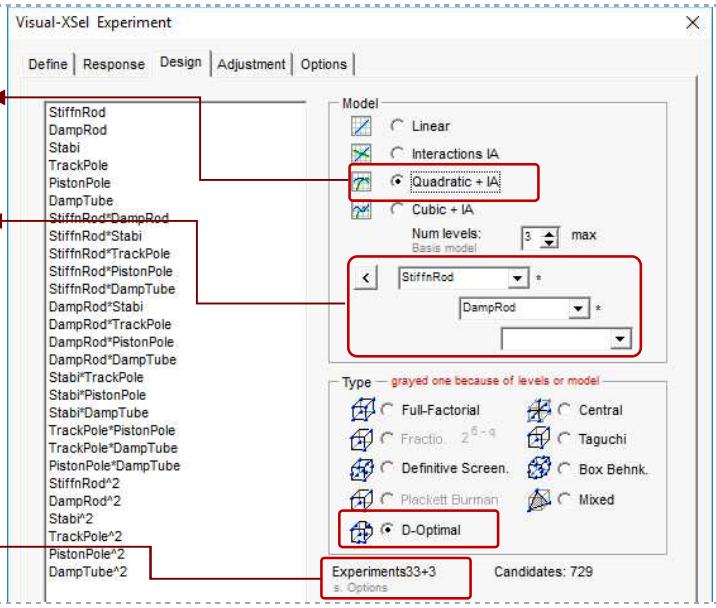
Via the rubric ***Response***, one or more “Y” can be defined for the results of the DoE.

The next step is to define the ***Model*** and the ***Type*** of the experiment. In this example a quadratic model with interactions is selected (this is sometimes called Response-Service-Model).

Also certain triple interactions can also be defined.

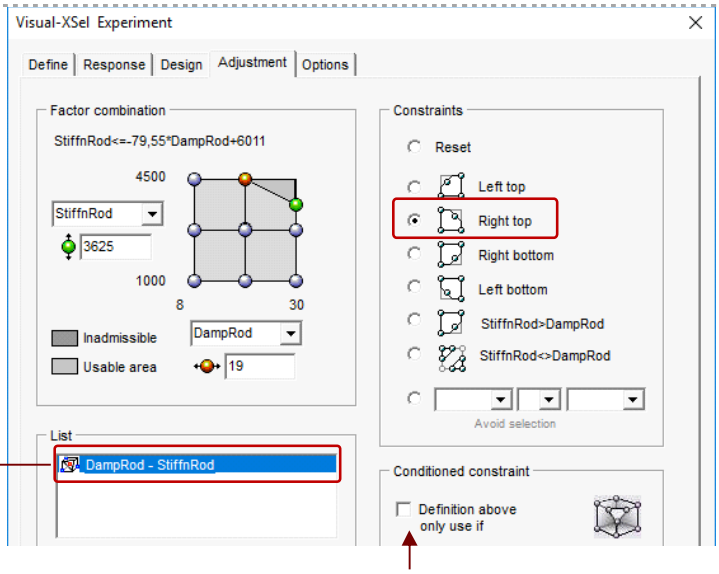
The standard-type is ***D-Optimal***, which allows the most options. If the used type is not suitable for the model or the number of factors, you will get a message later, or some options are grayed out.

Right below the number of experiments is shown + 3 for the number repetitions.



On the next page it is possible to define ***Constrains***. Maybe there is a technical restriction, which is not possible. In the shown example the StiffnRod=4500 cannot be tested in combination with DampRod=30. But DampRod=15 is possible. To fix this constrain, push the button New, which is below of the ***List***.

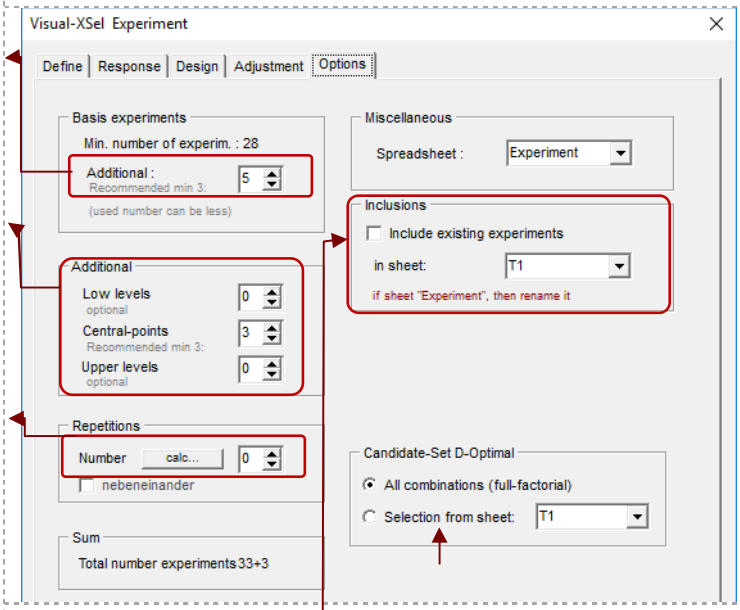
Note:
The view of the Factor combinations is only possible for quantitative factors and for D-Optimal design.



Hint: Constrains can be combined with other conditions, so that only an edge will be excluded from the DoE.

Under the rubric ***Options*** you can define additional experiments for D-Optimal design to ensure that the p-values can be calculated in the evaluation later on. The minimum is 1.

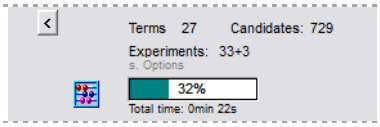
Under ***Additional*** you can define repetitions with the same factor values to determine the so called “pure error”. This is needed to get the information of the inaccuracy of the measurement-procedure (equipment).
Alternatively ***Repetitions*** for each trial can be set. Under the button ***calc*** it is possible to calculate how much trials are needed to detect the effect sure.



Especially for D-Optimal designs, a very important feature is the possibility to use already existing measurements. Use ***Inclusions*** and define the table where are these results. The column-names must be in the same order like in the list before (first col. is always no.)

Hint: For D-Optimal designs a pre-defined table can be used, from which the algorithm will try to get the best determinant. This is an alternative to constrains, may be if complex restrictions with categorical factors are excluded from the sheet.

Now start to create the plan with button ***Create***. If D-Optimal is selected the iterations begins.



Finally the table with the DoE matrix is shown, where the empty column for the “response” have to be filled.

A	B	C	D	E	F	G	H
No	StiffnRod	DampRod	Stabi	TrackPole	PistonPole	DampTube	Y
1	2750	19	12500	5750	225000	210000	
2	1000	8	20000	1500	225000	210000	
3	4500	8	5000	5750	50000	400000	
4	2750	30	5000	10000	400000	210000	

The next step is to evaluate the results. For this please use

www.weibll.de/COM/Data_Analysis.pdf

If there are any suggestions or hints about this short introdution, please give us a feedback to

info@crgraph.de