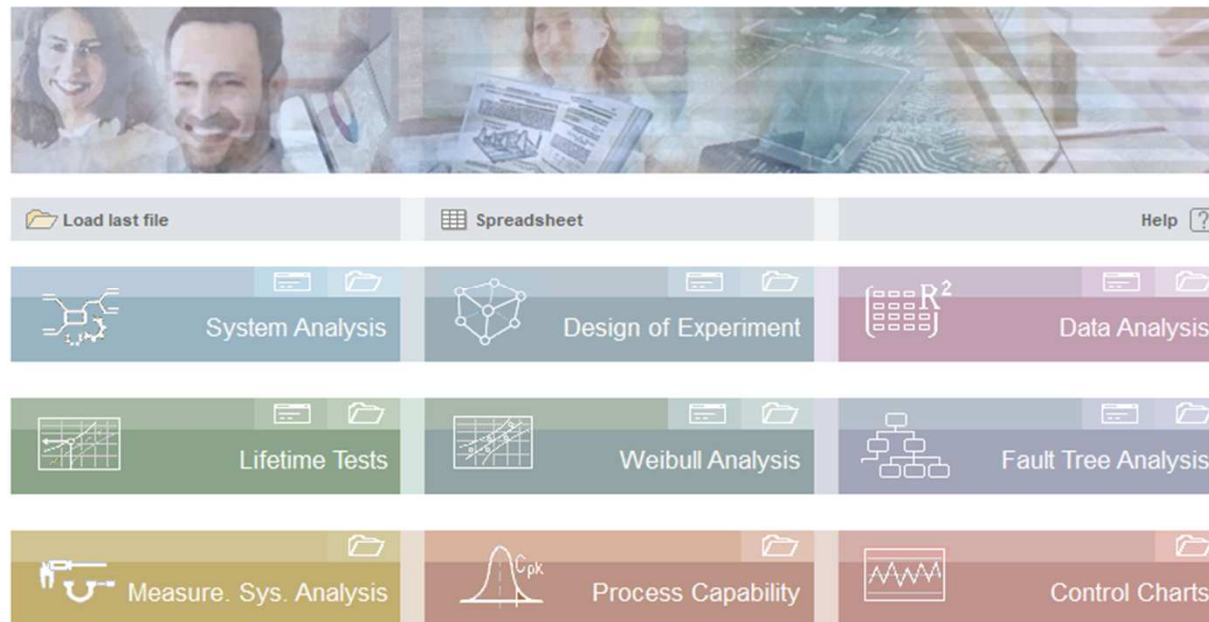


Basic functions and examples of statistics & Six Sigma

Visual-XSel 20.0



The 3 versions of Visual-XSel 20:

Standard (Home & privat)	Weibull & DoE	Analyzer
Entry-level version with statistics and Excel-extensions	Full statistics, Weibull-analyses, DoE and Process-Capability	Additionally up to 255 param. for data analysis and FTA

Detailed functions and price list: crgraph.de/downloads/software/Versions.pdf

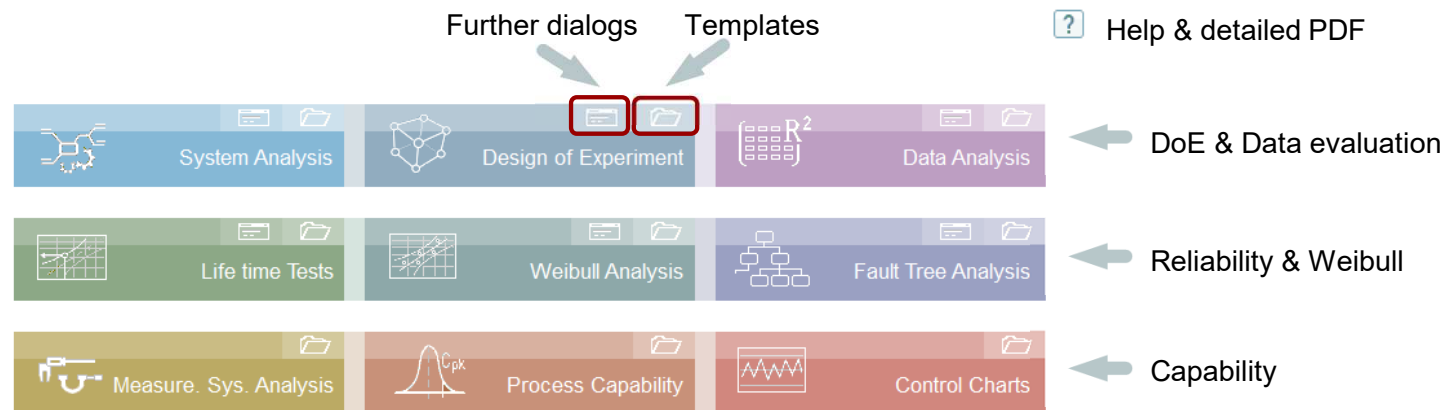
Main Guide

The Main Guide shows three important statistical methods: DoE, Reliability and Capability analyses. A pre investigation for DoE is to find the relevant parameters with the System Analysis.

Most of the methods are available as templates. The calculation methods are open source, can be viewed and easily modified.



← This icon starts the Main Guide



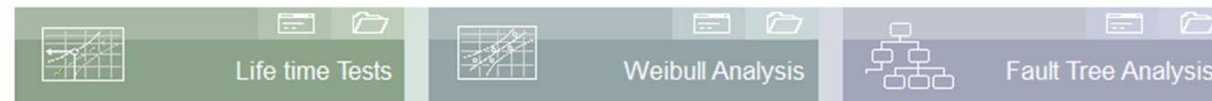
Detailed profiles with introduction to the methods and subsequent program descriptions can be found under the links shown



www.weibull.de/COM/System_Analysis.pdf

www.weibull.de/COM/Design_of_Experiment.pdf

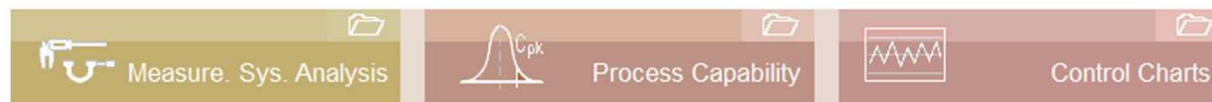
www.weibull.de/COM/Data_Analysis.pdf



www.weibull.de/COM/Life_Time_Tests.pdf

www.weibull.de/COM/Weibull_Analysis.pdf

www.weibull.de/COM/Fault_Tree_Analysis.pdf



www.weibull.de/COM/Measurement_System_Analysis.pdf

www.weibull.de/COM/Process_Capability_Studies.pdf

www.weibull.de/COM/Control_Charts.pdf

Data and representation

An Excel-like spreadsheet is available on the left, whose width is automatically aligned with the data, or can be adapted manually. On the right there is the main window for all diagrams, output etc. The representation is exact that what you get at printing out.

Quick access to the most important functions

Clear and simple Ribbon Bar

Graphics and output are displayed as they appear in the printout. Easily export, e.g., to Powerpoint

Excel-like Spreadsheet

variable width

Multiple Regression
Response versus factors

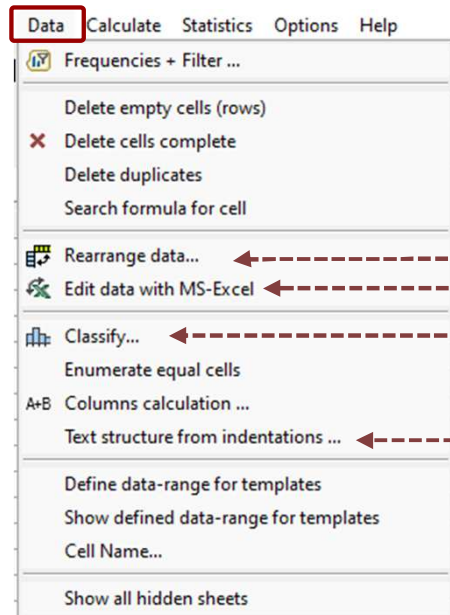
$$Accel = (-0.838326) \frac{DampRod - 19}{11} + (-1.166858) \frac{StiffnR - 2750}{1750} + 0.60649 \frac{StiffnR - 2750}{1750} \frac{DampRod - 19}{11} + 1.054252 \left(\frac{StiffnR - 2750}{1750} \right)^2$$

Stabi = 12500
TrackPole = 5750
PistonPole = 225000
DampTube = 210000

Easily switch to Excel with everything you are used to

Spreadsheet functions

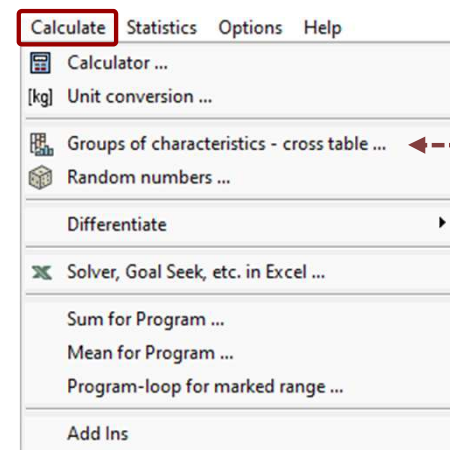
There are powerful editing functions for the table, for example for classifying data or building groups for characteristics



Quick data rearrangement, much easier than Pivot

You can easily switch between Excel and Visual-XSel in order to be able to use all the usual functions

Creates an outline from indented texts from which structure diagrams can be displayed



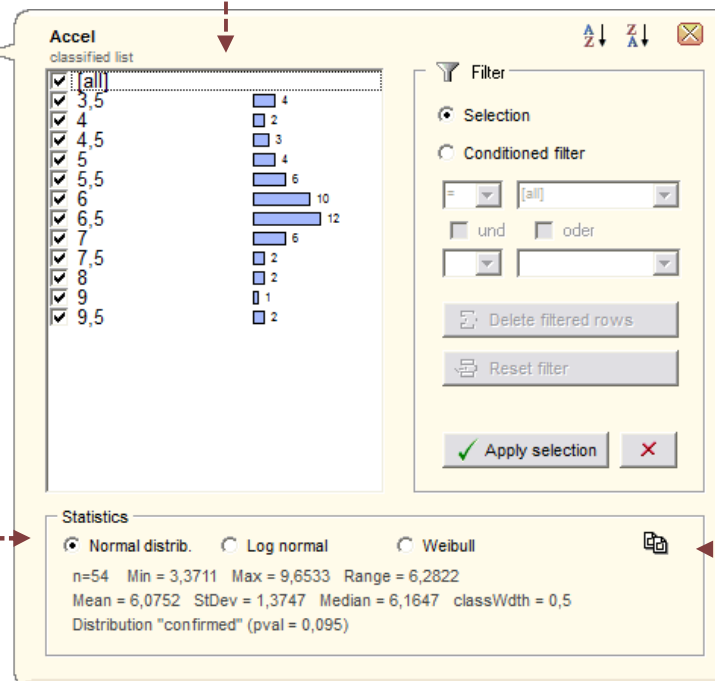
All of Excel's usual functions can simply continue to be used

Filter & quick statistics

Click on the first row, or mark the column, a filter symbol appears

D	E	F	G	H	I
:kPole	PistonPole	DampTube	Accel		
4750	210000	69000	9,49469		
4750	210000	69000	8,08628		
4750	210000	69000	7,23335		
4750	210000	69000	6,67517		
4750	210000	69000	6,28572		
4750	210000	69000	6,00264		
4750	210000	69000	5,78746		
4750	210000	69000	5,61431		
4750	210000	69000	6,18275		
4750	210000	69000	5,8643		
4750	210000	69000	6,67517		

Depending on the data, a frequency distribution is shown (numerical are classified here).

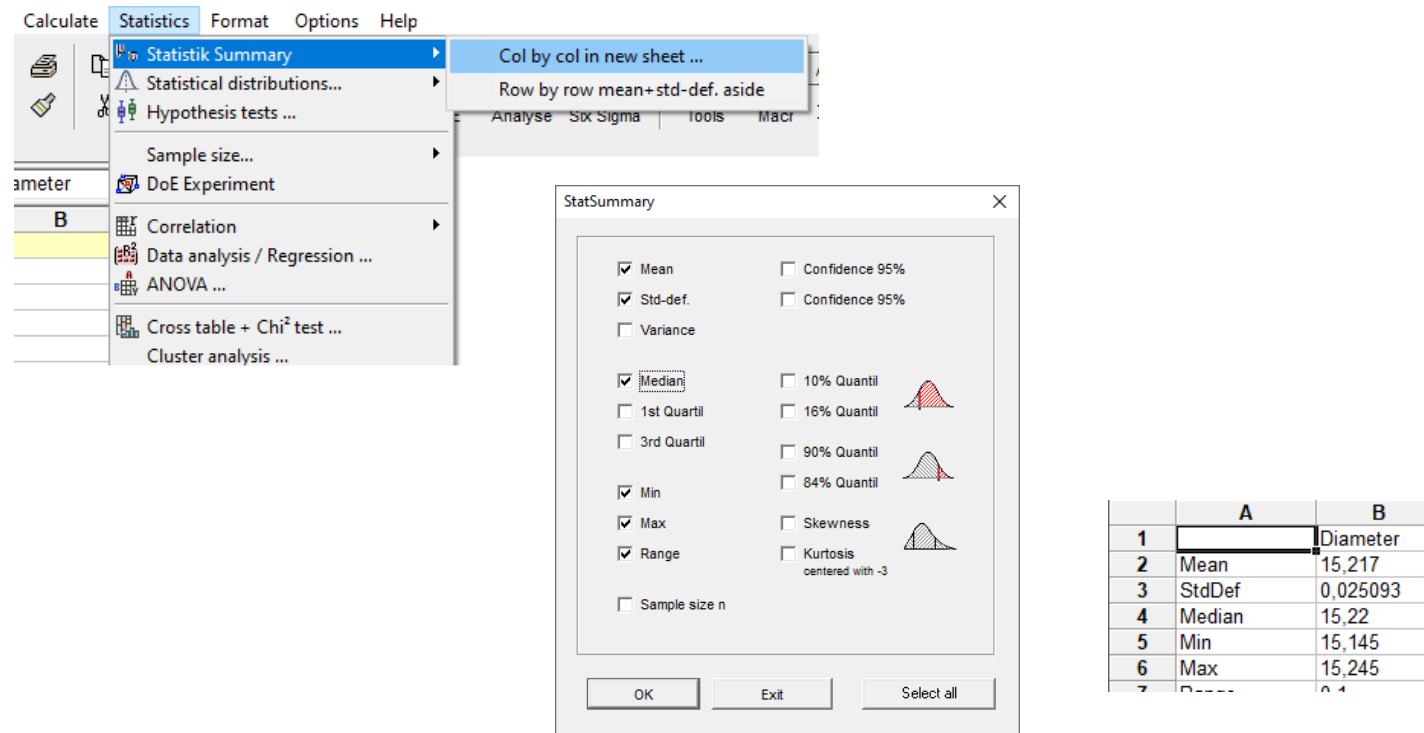


The statistics below show the most important characteristic values as well as a statistical test for normal distribution.

click here to copy the results to the clipboard

Descriptive statistics

More extensive characteristic values also for several columns are possible via Statistics Summary



Calculate Statistics Format Options Help

- Statistik Summary
 - Col by col in new sheet ...
 - Row by row mean+std-def. aside
- Statistical distributions...
- Hypothesis tests ...
- Sample size...
- DoE Experiment
- Correlation
- Data analysis / Regression ...
- ANOVA ...
- Cross table + Chi² test ...
- Cluster analysis ...

StatSummary

☒ Mean
☒ Std-def.
☐ Variance
☒ Median
☐ 1st Quartil
☐ 3rd Quartil
☒ Min
☒ Max
☒ Range
☐ Sample size n

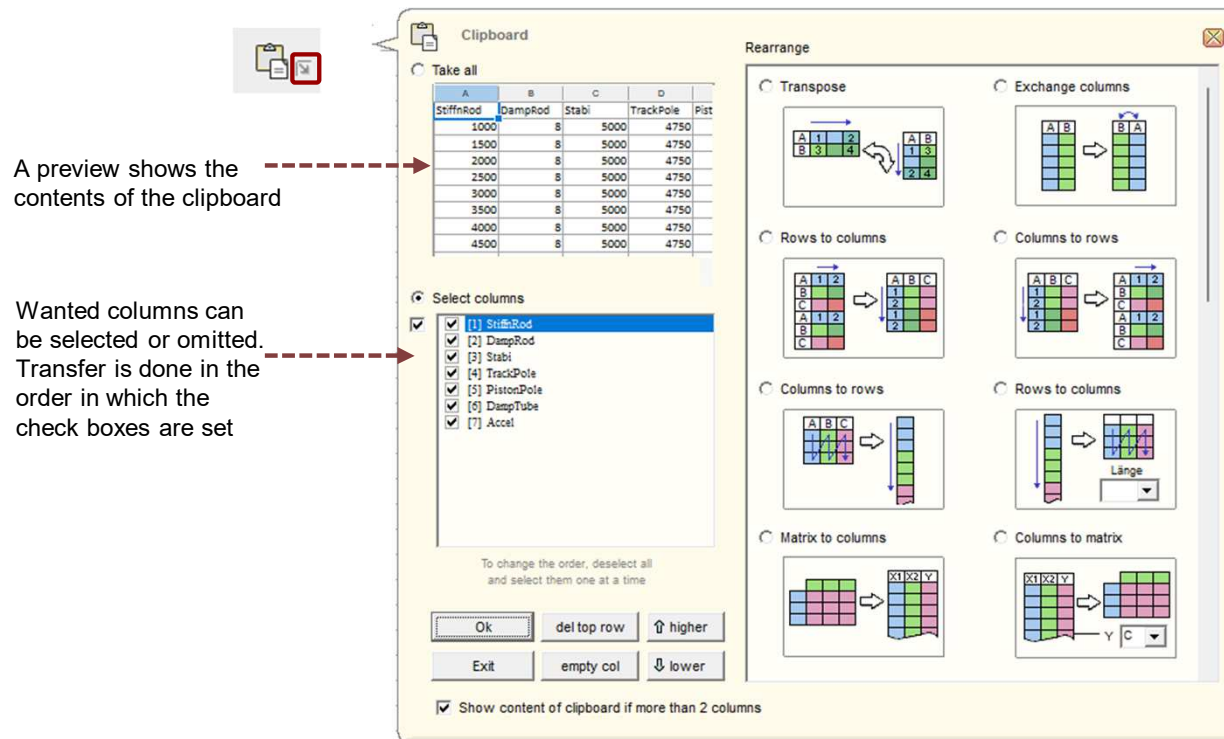
☐ Confidence 95%
☐ Confidence 95%
☐ 10% Quantil
☐ 16% Quantil
☐ 90% Quantil
☐ 84% Quantil
☐ Skewness
☐ Kurtosis centered with -3

OK Exit Select all

	A	B
1		Diameter
2	Mean	15,217
3	StdDef	0,025093
4	Median	15,22
5	Min	15,145
6	Max	15,245
7		

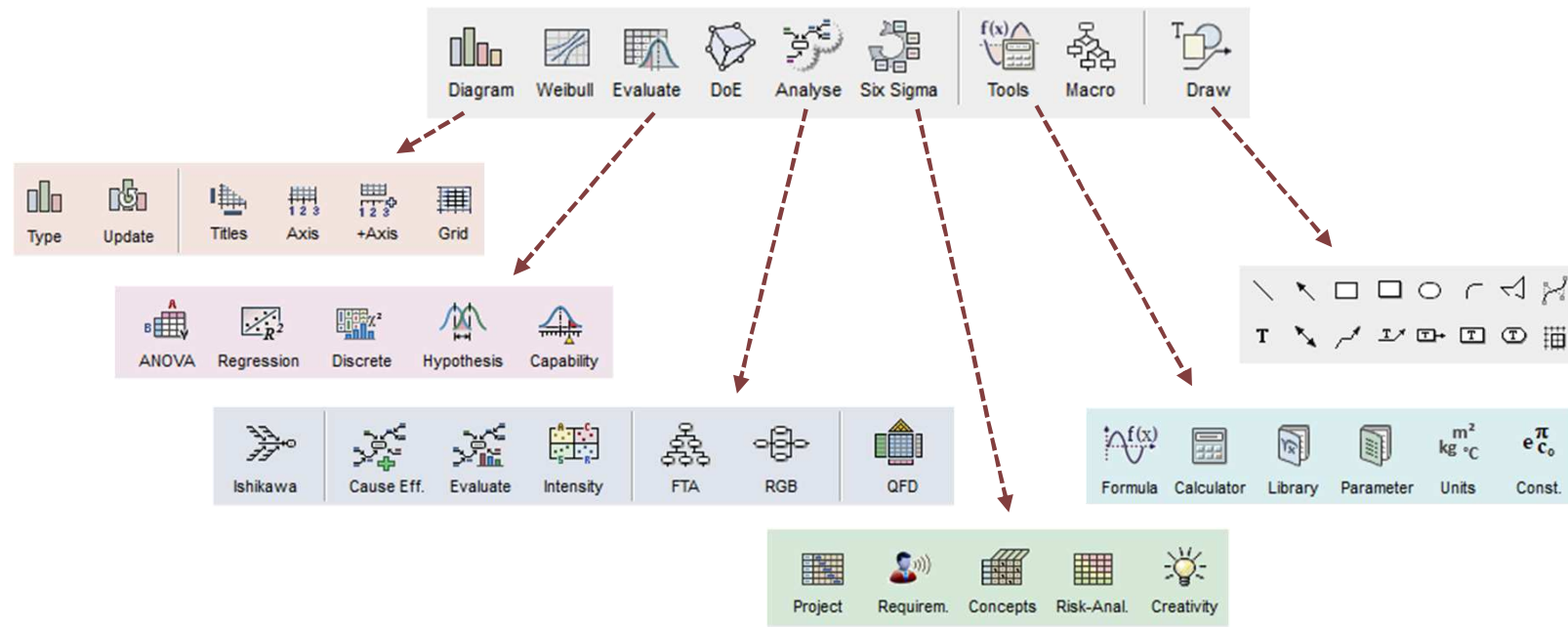
Special paste

When pasting data from the clipboard, data columns can be selected and or rearranged if there are more than 2 columns of data on the clipboard (equal to Edit / Paste contents / transform before paste)



The icon bar

The most important statistical methods



The icons Weibull and DoE are described in separate sections

Icon bar Evaluation

Data evaluation

Evaluate

ANOVA

- ANOVA One Way ($\mu_1=\mu_2$) ...
- ANOVA One Way (balanced $\mu_1=\mu_2=\mu_3$...) ...
- ANOVA One Way ($\mu_1=\mu_2$; $\mu_1=\mu_3$; $\mu_2=\mu_3$) ...
- ANOVA Two Way (tabular $x_1 x_2 - y$) ...
- ANOVA Two Way (balanced $y - x_1 x_2 x_3$...) ...
- ANOVA Two Way (nested $y - x_1 x_2$) ...
- Modell-ANOVA ($y - x_1 x_2 x_3$...) ...
- σ^2 F-Test (variance) ...
- t-Test (mean) ...
- Multi-t-Test Simultan Tukey ...
- More ...

Regression

- Analysis Guide...
- Multiple Regression manuel ...
- Regression (straight-line) via diagram ...
- Multiple Regression full auto ...
- PLS Partial Least Square (correlating data) ...
- Discrete Regression (response with two levels) ...
- Neural Networks ...
- Use all data-rows for model
- For rows mean+std-dev right beside
- Repetitions from columns to rows
- Model-values in sheet
- Normalized data table -1..+1
- Reset model

Discrete

- Cross table + χ^2 test ...
- Discrete Regression (response with two levels) ...

Hypothesis

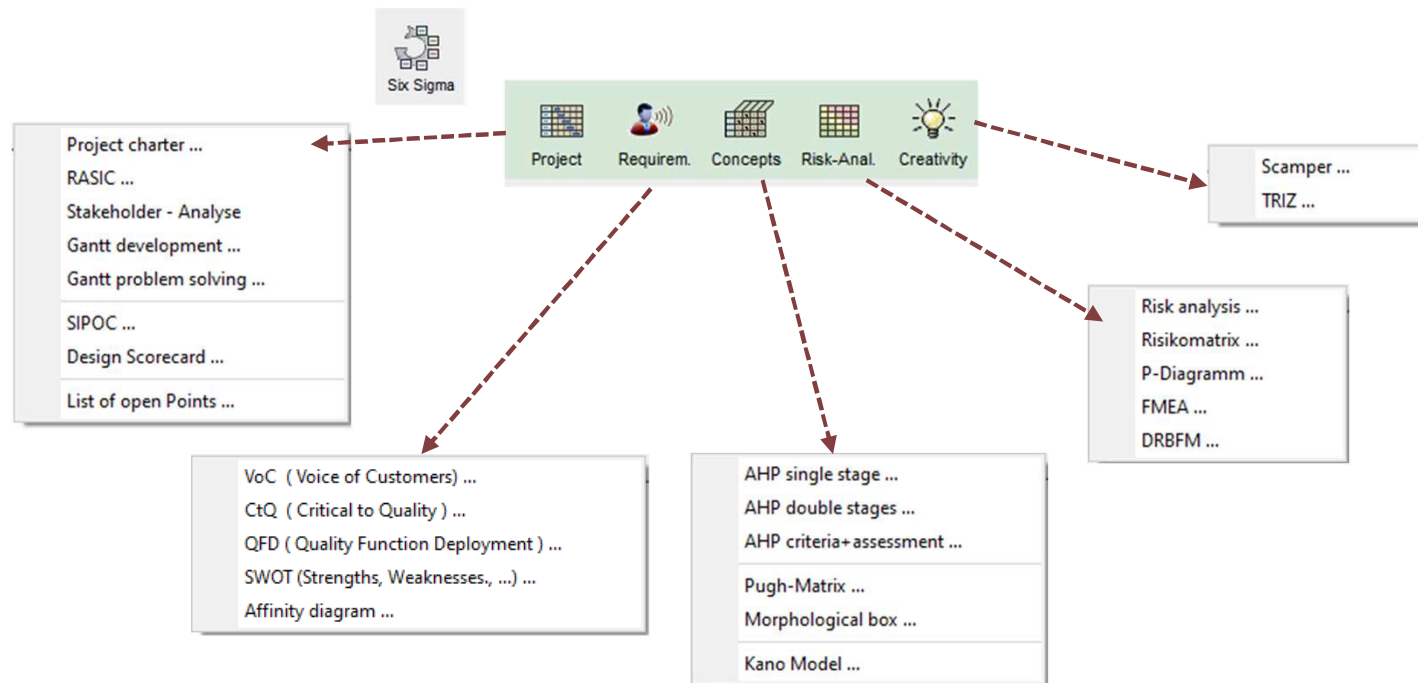
- Guide hypotheses ...
- Test of normal-/Weibull-distribution (non classified)
- Test of mixed distribution
- Test of outliers (normal distr.)
- t-Test (one sample) ...
- t-Test (two samples normal) ...
- Multi t-Test ...
- u-Test (two samples non normal) ...
- Sign test (one sample) ...
- Sign test Wilcoxon (one sample) ...
- Mood's Median Test (more samples, median) ...
- Kruskal Wallis Test (more samples, ranking) ...
- σ^2 F-Test (two samples normal) ...
- Levenes Test (more samples all distr.) ...
- Bartlett Test (more samples) ...
- Binomial-Test ...
- Poisson-Test ...
- χ^2 cross tab test ...
- χ^2 multi cross tab test ...
- χ^2 homogeneity test ...
- More tests ...

Capability

- MSA Overview
- MSA continuous measurements
- MSA discrete measurements
- MSA ordinal scaled ...
- More ...
- Guide process capability ...
- Machine capability C_m/C_{mk} ...
- Process performance P_p/P_{pk} ...
- Process capability C_p/C_{pk}
- More ...
- Tolerance specification

Icon bar Six Sigma

The most important Six Sigma and DFSS methods



The calculator

The alphanumerical calculator with special functions

The input is done as in a fully defined formula. At the beginning, a variable for the result is needed, here $y=$

Available math. functions can be accessed under the symbol **Sin**

The most recent entries can be retrieved here

Constants

Formula library

Formula-Library

Alphanumeric Calculator

Constants window:

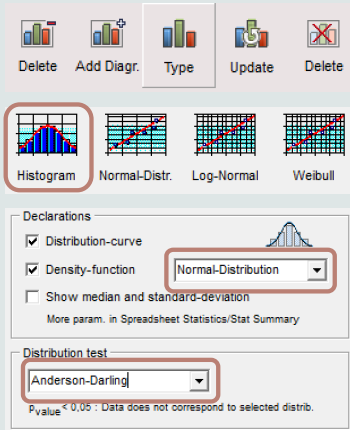
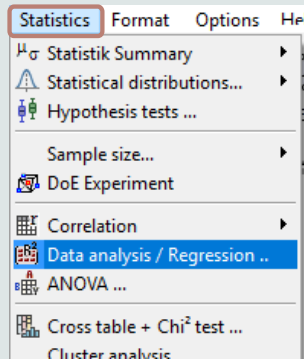
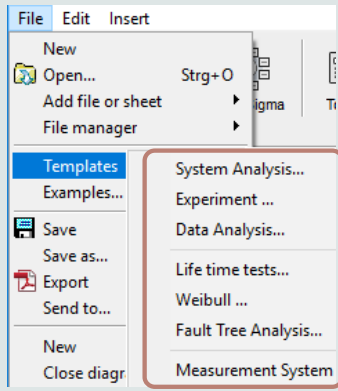
- Physical constants: $\pi=3,141592654$, $e=2,718281828$, $g_0=9,80665$, $k_{Boltz}=1,380662E-23$, $\epsilon_0=8,854188E-12$, $\mu_0=1,2566371E-6$, $\gamma=6,672E-11$, $c_0=299792458$, $R_0=8,31441$, $V_0=22,414$, $Farady=96484,56$, $U_{Avog}=1,660565E-27$, $\alpha=1E50$
- Buttons: Use const., New constant, Delete

Formula-Library window:

- Library: Electricity, ImpulsePush, InertiaMoments, Integrals, Movement, Solid, SolidCentre, Statistic, Stream, Supports, Surfaces, SurfacesCentre, SwingSystems, **Weibull**
- Own: (empty)
- Formulas: $\sigma^2 = T^2 \left[\Gamma\left(1 + \frac{2}{b}\right) - \left(\Gamma\left(1 + \frac{1}{b}\right)\right)^2 \right]$, $A_D = \frac{MTTF}{MTTF + MTTR}$, $R = 100 \left[1 - P_A \right]^{(n+1) \cdot L_v^b}$, $P_A = 100 \left[1 - R^{(n+1) \cdot L_v^b} \right]$, $n = \frac{1}{L_v^b} \frac{\ln(1 - P_A)}{\ln(R)} - 1$, $L_v = \left[\frac{1}{n+1} \frac{\ln(1 - P_A)}{\ln(R)} \right]^{\frac{1}{b}}$

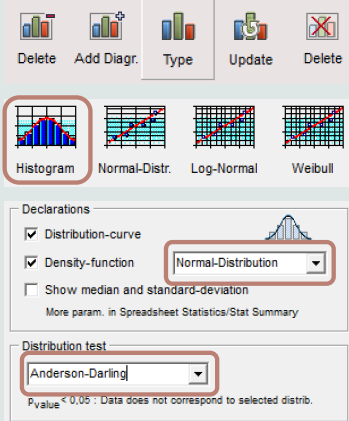
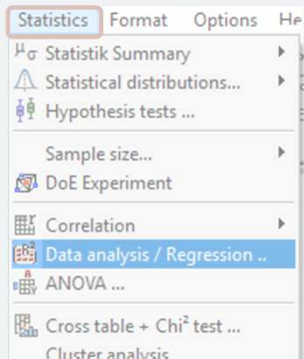
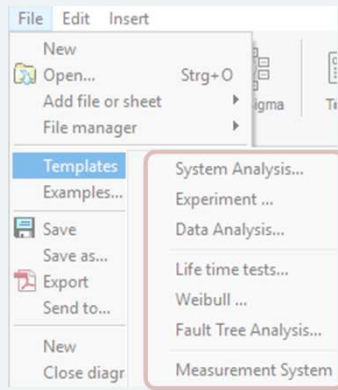
Statistical methods/functions

There are three ways to apply statistical methods.

Diagram-functions	Internal functions	Templates
<p>e.g. test of normality, hypothesis of equality with Boxplot or test of normality</p> <p>⇒ Select <i>Diagram</i></p> 	<p>e.g. calculation of distributions, DoE, regression, sample size, etc.</p> <p>⇒ Select menu <i>Statistics</i></p> 	<p>e.g. hypothesis-test, or Weibull-Analysis.</p> <p>⇒ Select menu <i>File/Templates</i></p> 

Examples for diagram functions

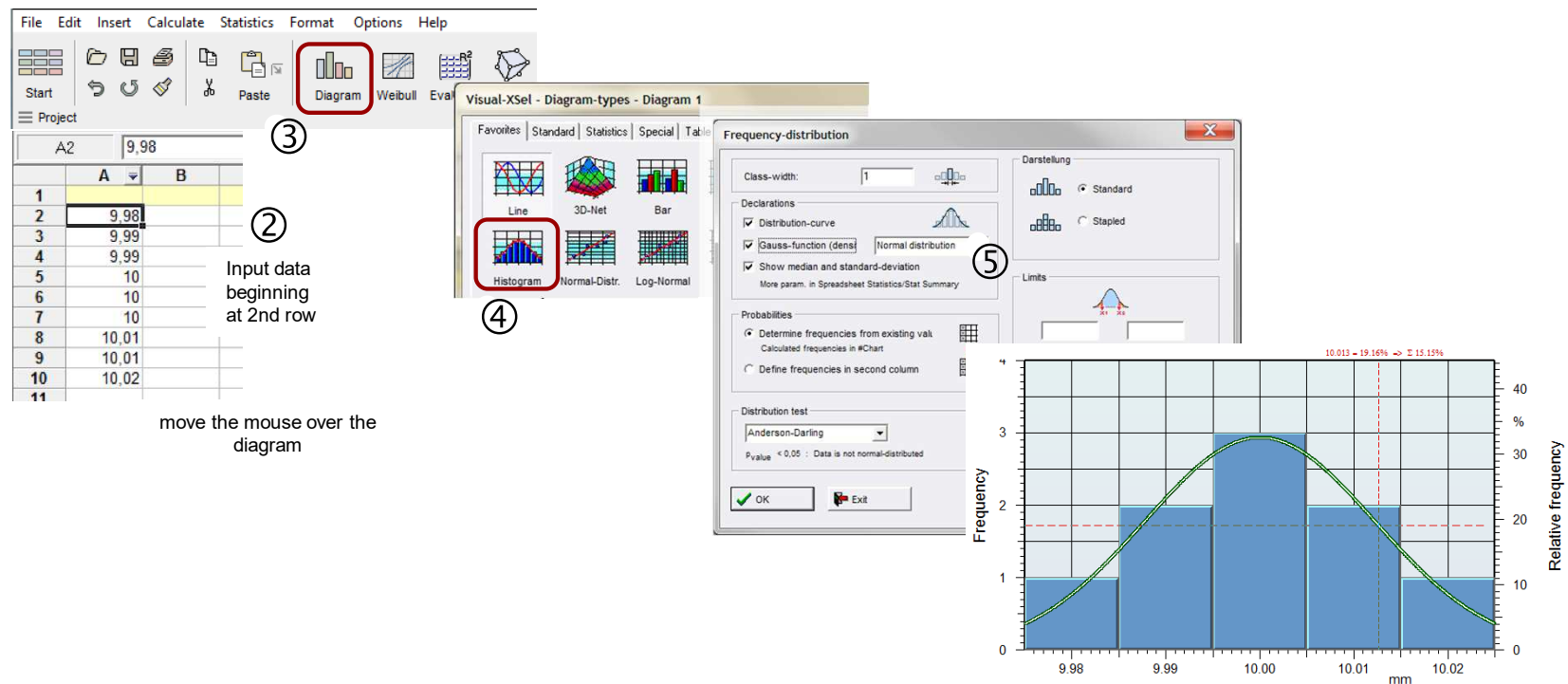
Examples from the diagram functions are shown first

Diagram-functions	Internal functions	Templates
<p>e.g. test of normality, hypothesis of equality with Boxplot or test of normality</p> <p>⇒ Select <i>Diagram</i></p> 	<p>e.g. calculation of distributions, DoE, regression, sample size, etc.</p> <p>⇒ Select menu <i>Statistics</i></p> 	<p>e.g. hypothesis-test, or Weibull-Analysis.</p> <p>⇒ Select menu <i>File/Templates</i></p> 

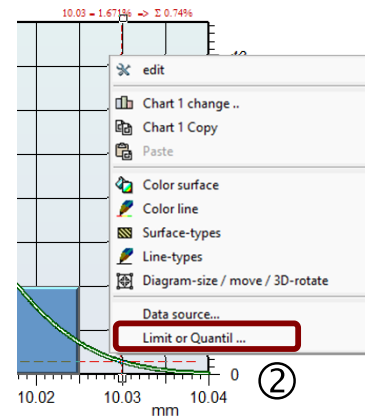
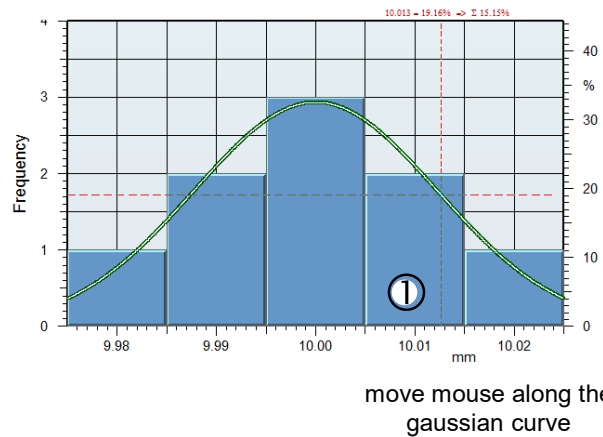
Creating a Histogram

A histogram can be made with various settings and representations

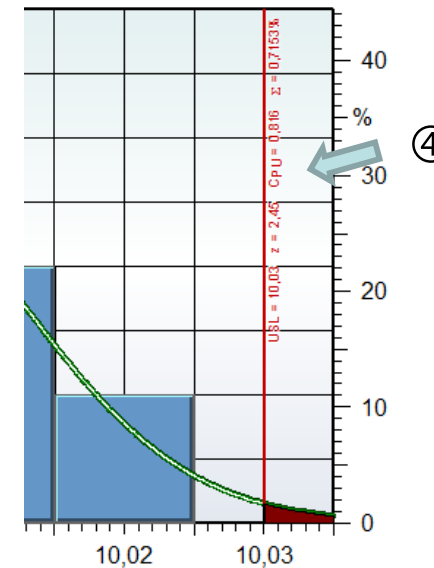
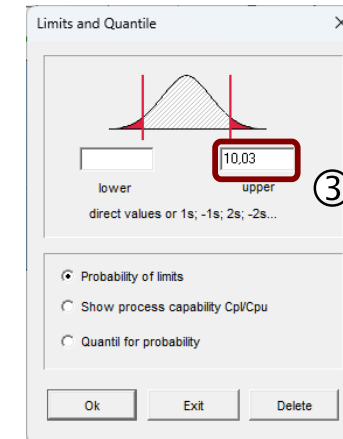
① Click in left area of the program to make visible the spreadsheet



Set a limit, for example for process capability



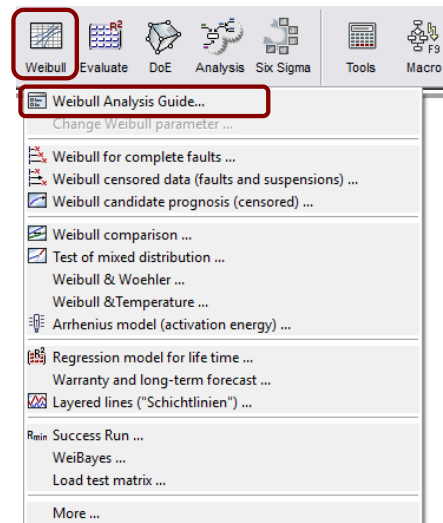
click the right mouse button and use Limit
(hint: no element has to be clicked before
and the mouse must be over the diagram)



Reliability & Weibull

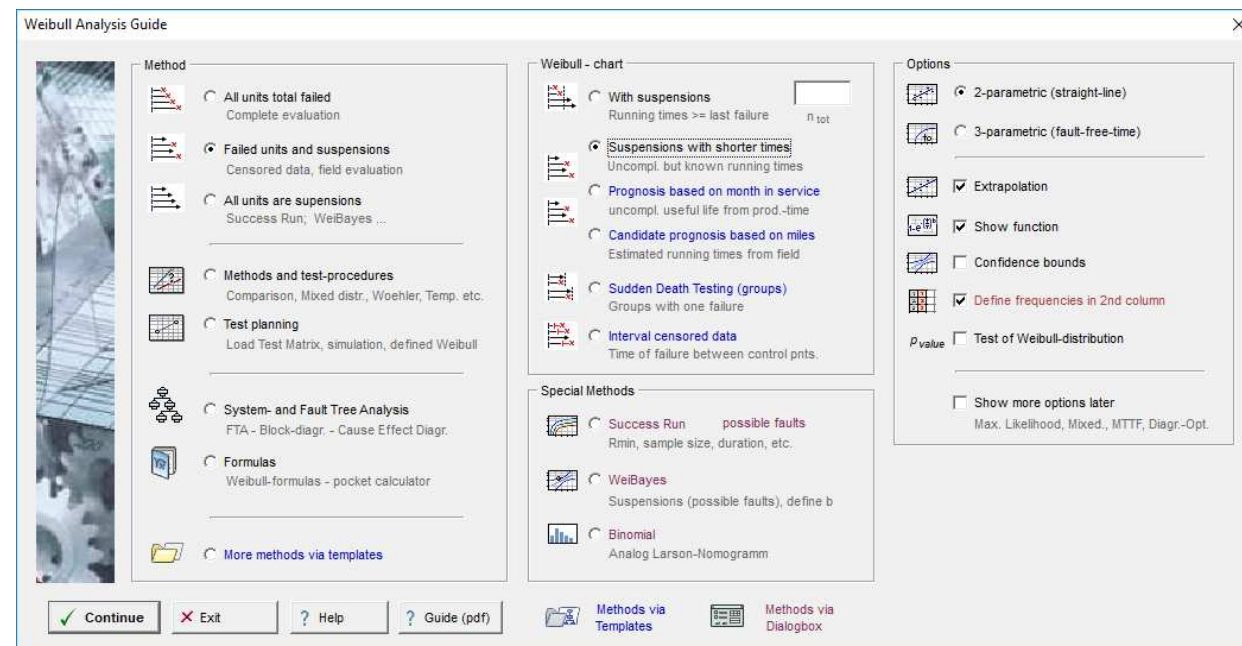
The most important reliability issues are available via the icon Weibull.

The Weibull Analysis Guide pilots you through more methods, especially for variants of the Weibull-chart.



More information

www.weibull.de/COM/Weibull_Analysis.pdf



Creating a Weibull-chart

	A	B
1		
2	1589	1
3	2934	1
4	4938	-1
5	5906	1
6	6958	1
7	8995	1
8	11293	1
9	13578	1
10	15000	-4

1. Running times at second row (first row legend).
The frequencies has to be defined in col. B
Suspensions must be marked with minus, e.g. "-1"
[File open](#) [Paste](#) [Paste Special](#)
2. Choose chart Weibull
or use icon on the right

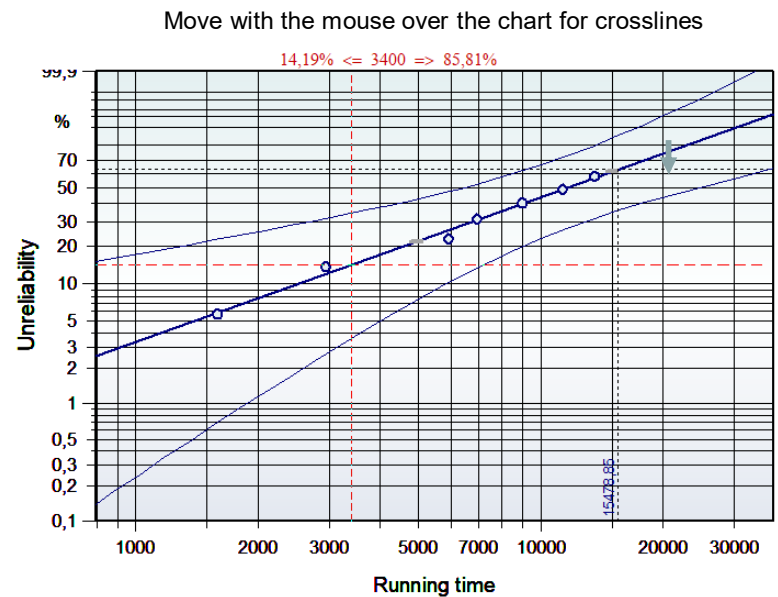
define here the number of faults and suspensions (marked with „-“).

define here the running times

More information

www.weibull.de/COM/Weibull_Analysis.pdf

Define running times (col A) and frequencies, (col B) or use *Paste*.
Click the Weibull icon and define the axis titles.



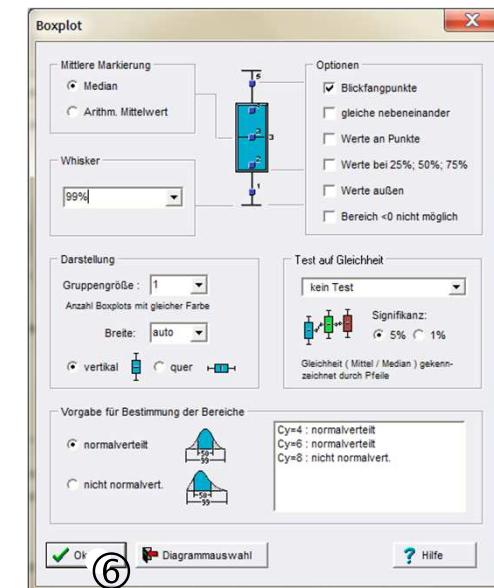
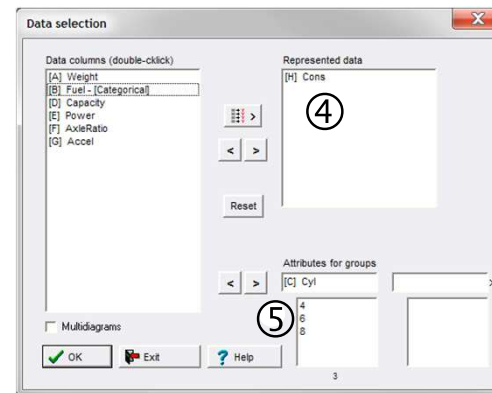
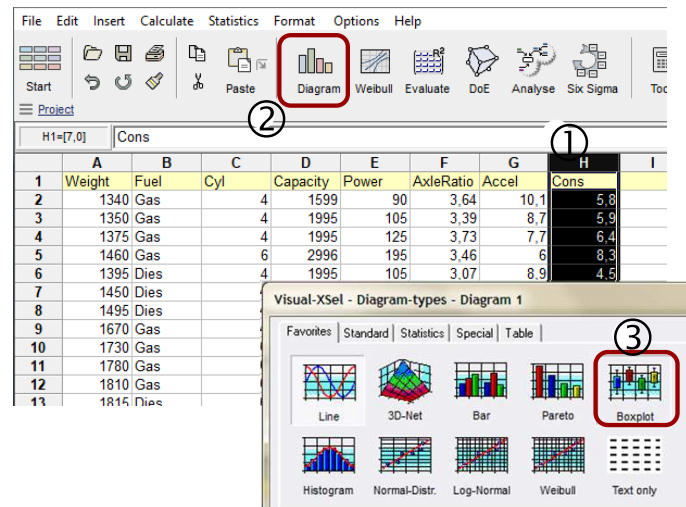
Move with the mouse over the formula, to get expert information

For the selected Weibull-Distribution a statistical test can be applied. The coefficient of determ. $R^2=0,99$ for the fitted distribution is good (may be not for extrapolating)
[Change distribution or test](#)

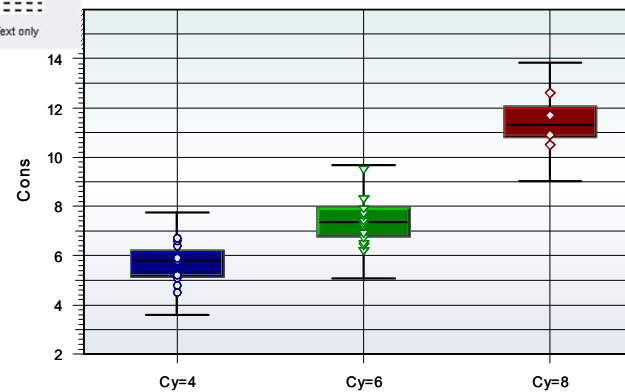
$T = 15478,85$ $b = 1,239$

$H = 100\% \cdot \left(1 - e^{-\left(\frac{t}{T}\right)^b} \right)$
 $t_{10} = 2515,6$ $R^2 = 0,9905$

Boxplot with category „Cylinder“

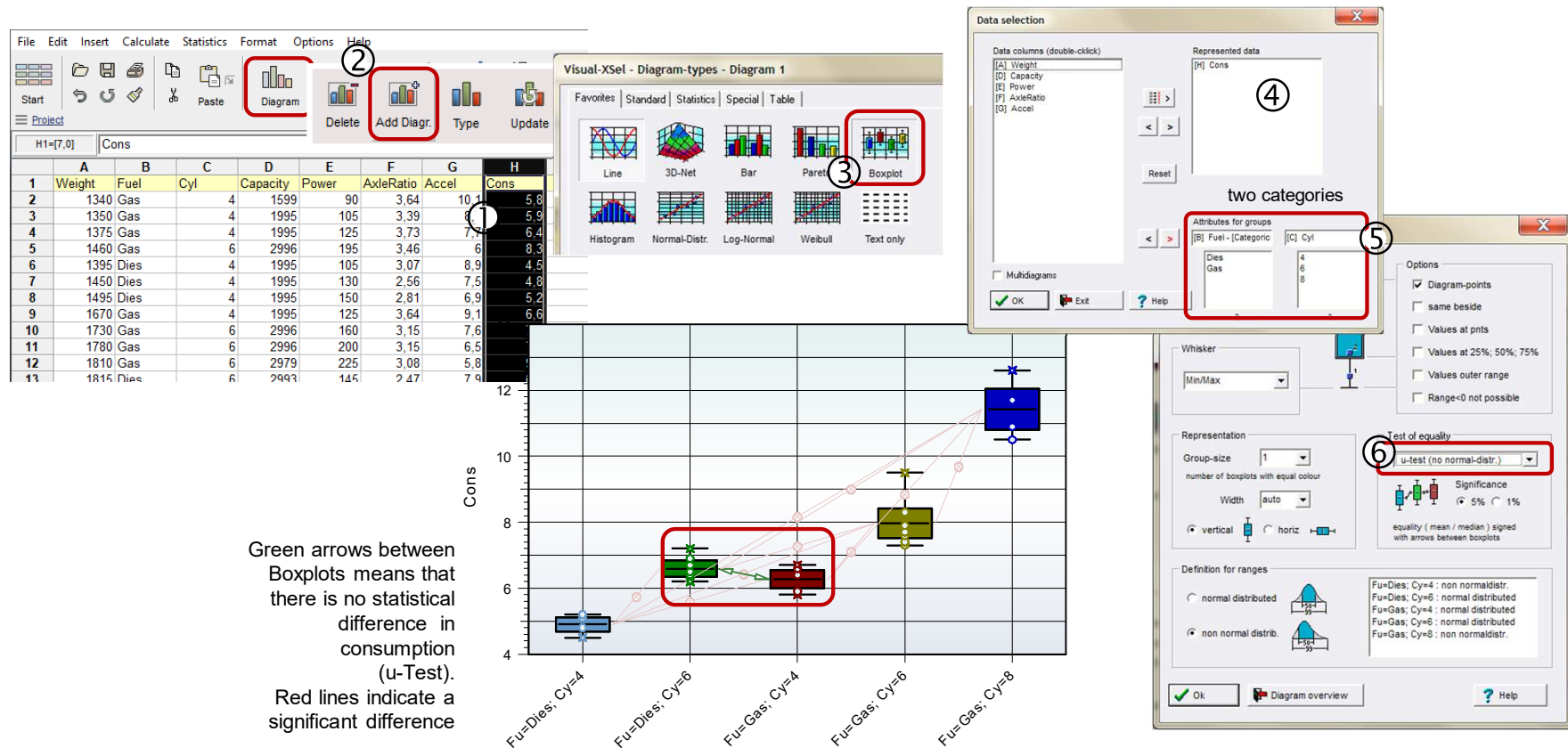


Menu Data/Spreadsheet and open file:
[Examples/Example_PLS_Consumption.xlsx](#)



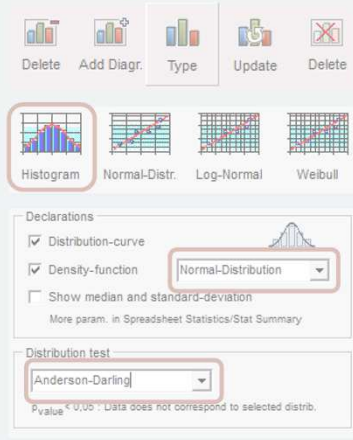
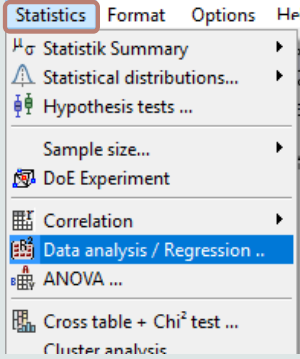
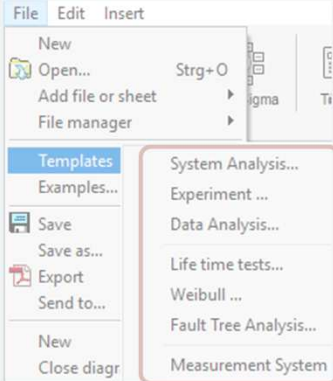
2nd Boxplot with category Fuel

Open Data/Spreadsheet T1 and mark column H. Add diagram with symbol (+)



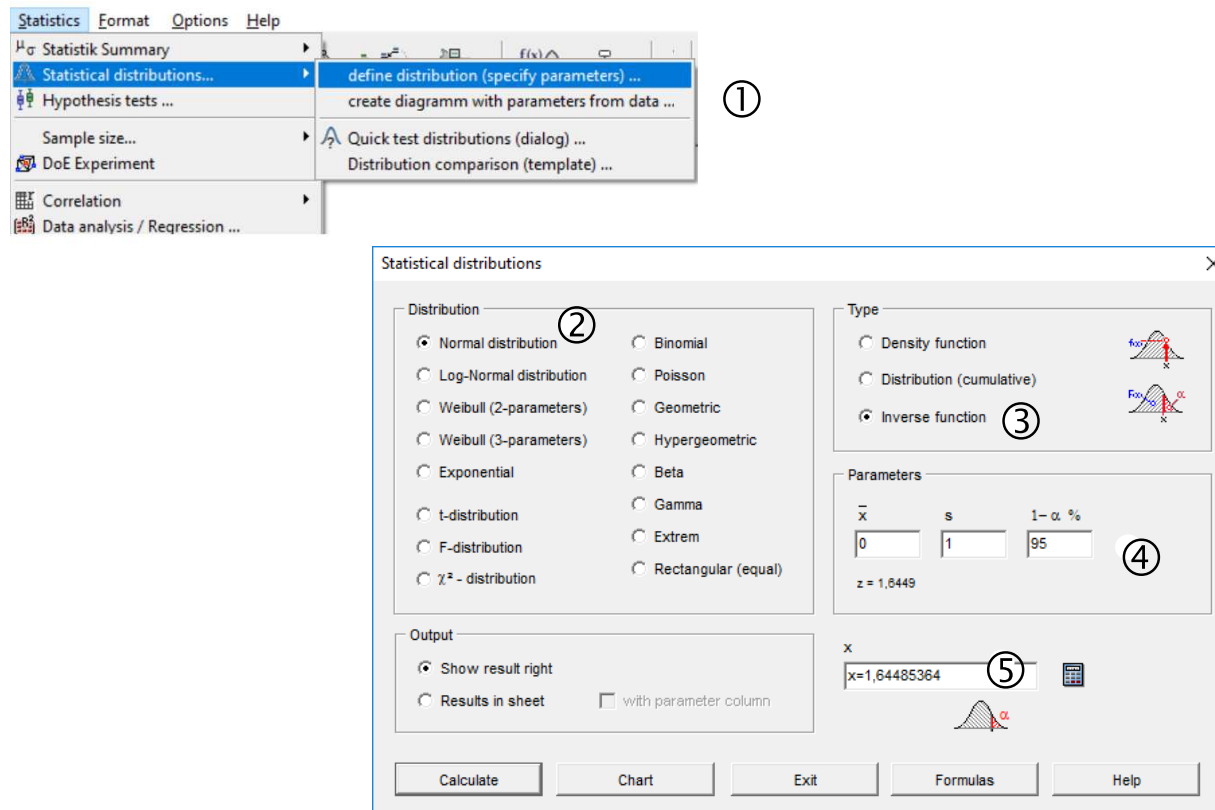
Examples for diagram functions

The following examples show internal functions

Diagram-functions	Internal functions	Templates
<p>e.g. test of normality, hypothesis of equality with Boxplot or test of normality</p> <p>⇒ Select <i>Diagram</i></p> 	<p>e.g. calculation of distributions, DoE, regression, sample size, etc.</p> <p>⇒ Select menu <i>Statistics</i></p> 	<p>e.g. hypothesis-test, or Weibull-Analysis.</p> <p>⇒ Select menu <i>File/Templates</i></p> 

How to calculate distribution values or the „z“-value

Statistical distributions - calculate values or display them as a graph



If using the Inverse normal distribution with mean = 0 and std-dev = 1, the result x (normally the quantile) has in this case the meaning of the so called „z“-value

Find the right distribution of data

The guide includes a distribution test and makes a suggestion which is the best (the one with the highest p-value, here the Weibull distribution)

The screenshot shows the 'Evaluate' window in Visual-XSel 20.0. On the left, a data table lists 'Diameter' values from 15,145 to 15,245. A histogram shows the frequency of these values. The main panel lists several distribution options with their corresponding p-values:

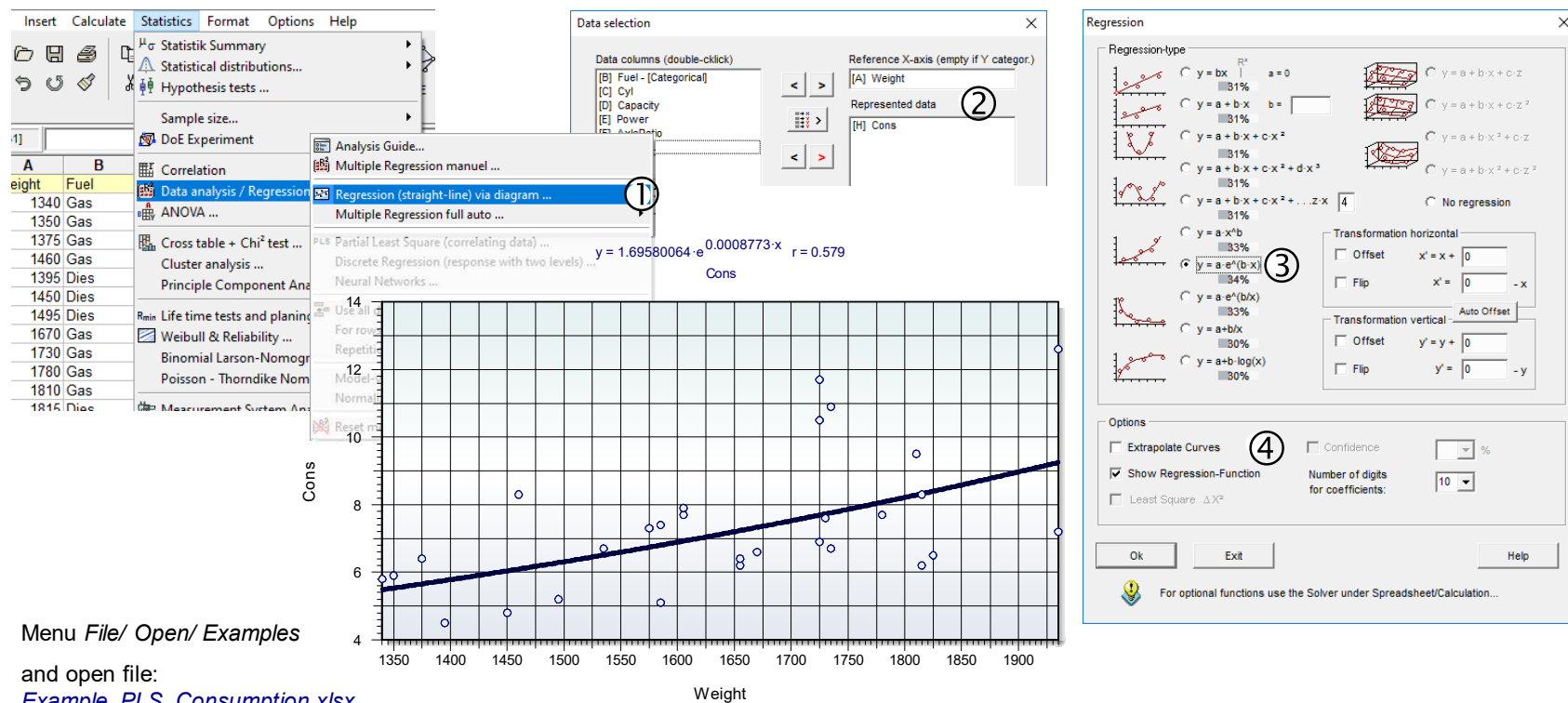
Distribution	Description	P value
Normal distribution	Standard for normal dimensions and properties. selection only if feature is not listed in the following block.	0,058
Folded normal 1st type	Straightness, levelness, roundness, cylindrical-, linear-, surface-shape, roughness, parallelism, perpendicularity, angularity, symmetry	0,000
Folded normal 2nd type	Imbalance, position, coaxiality, concentricity	0,000
Lognormal-distribution	One-sided limited features, especially time and cycles	0,057
Weibull-Verteilung (3-parametrig)	One-sided limited features, in particular service life, cycles, etc. If not one-sided or lifetime, then the normal-distribution should have priority.	0,437
Mixed distribution	Unstable process (several machines, batches or new tool)	if all previous < 0.05

Below the list, it states: 'Possible outlier at the beginnig'. At the bottom right, a section titled 'Possible tolerances for Cpk=' shows: Median = 15,22, LSL = 0, USL = 15,28 (15,28)*. A note below this says '* Estimated values for conf. 90%'. A red arrow points from the text 'Possible tolerances for the data are displayed here' to this section.

Statistical tests check which distribution is suitable

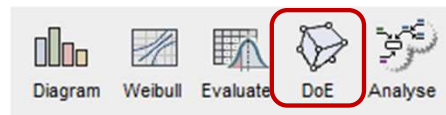
Standard Regression

x-y regression can be realized via a line diagram



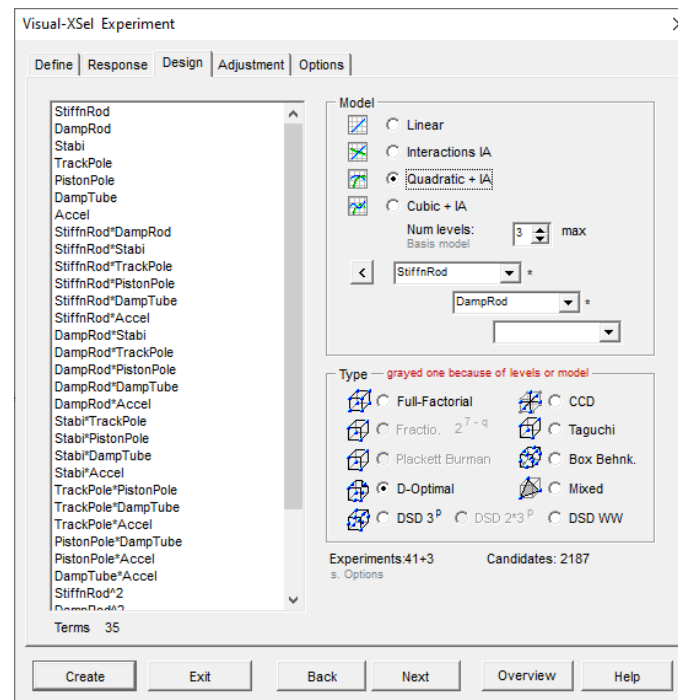
Design of Experiments - DoE

In Visual-XSel all important designs are available and new the DSD 2*3^p and DSD IA (extension for Definitive Screening Designs, e.g. for interactions)

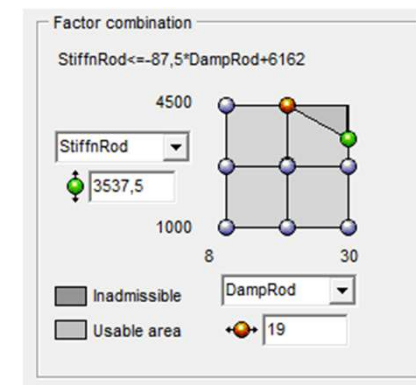


Detailed description under:

www.weibull.de/COM/Design_of_Experiment.pdf



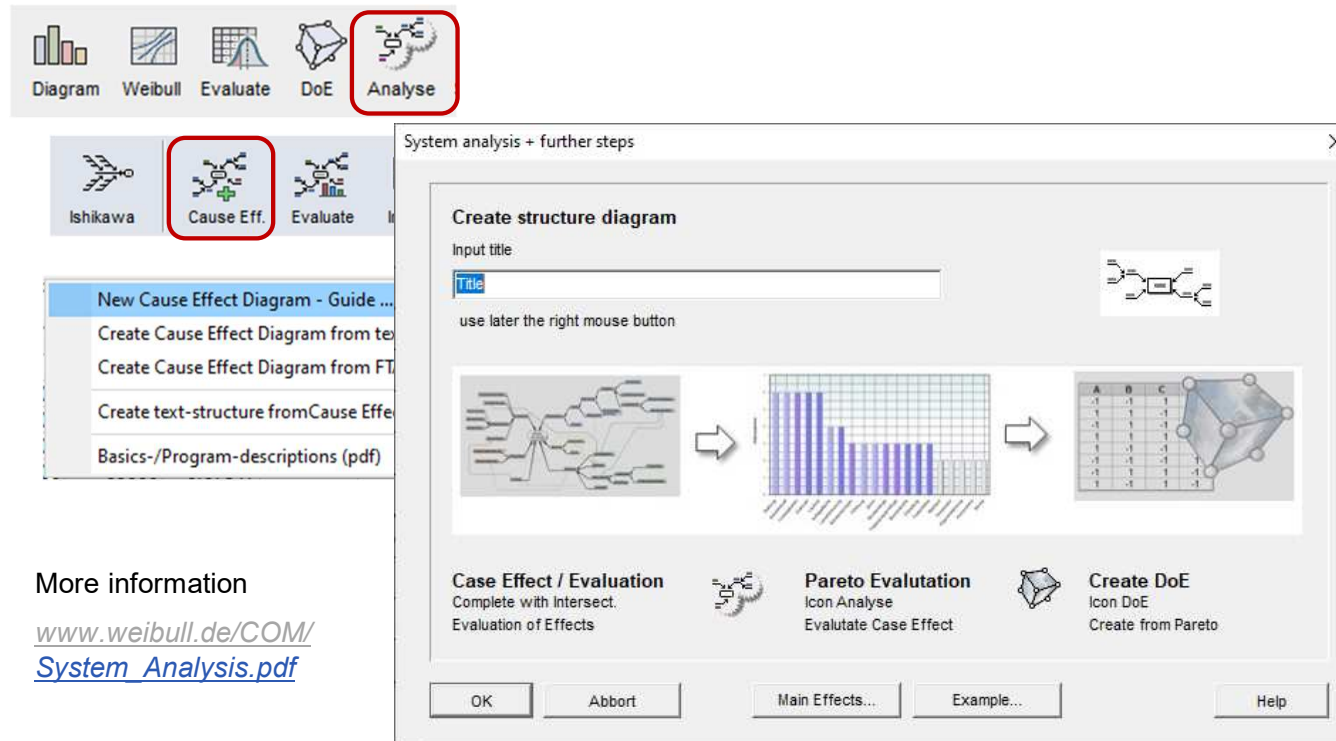
- Import parameters from tables (other progr.)
- Derive DoE's from structure diagrams
- Up to 120 parameters and 16 responses
- Categorical parameters
- 3-times interactions
- Considering existing experiments
- Techn. constrains can be defined
- and much more ...



System analyses

In Visual-XSel there are a variety of analyses tools, like a cause effect diagram

③



More information

[www.weibull.de/COM/
System Analysis.pdf](http://www.weibull.de/COM/System%20Analysis.pdf)



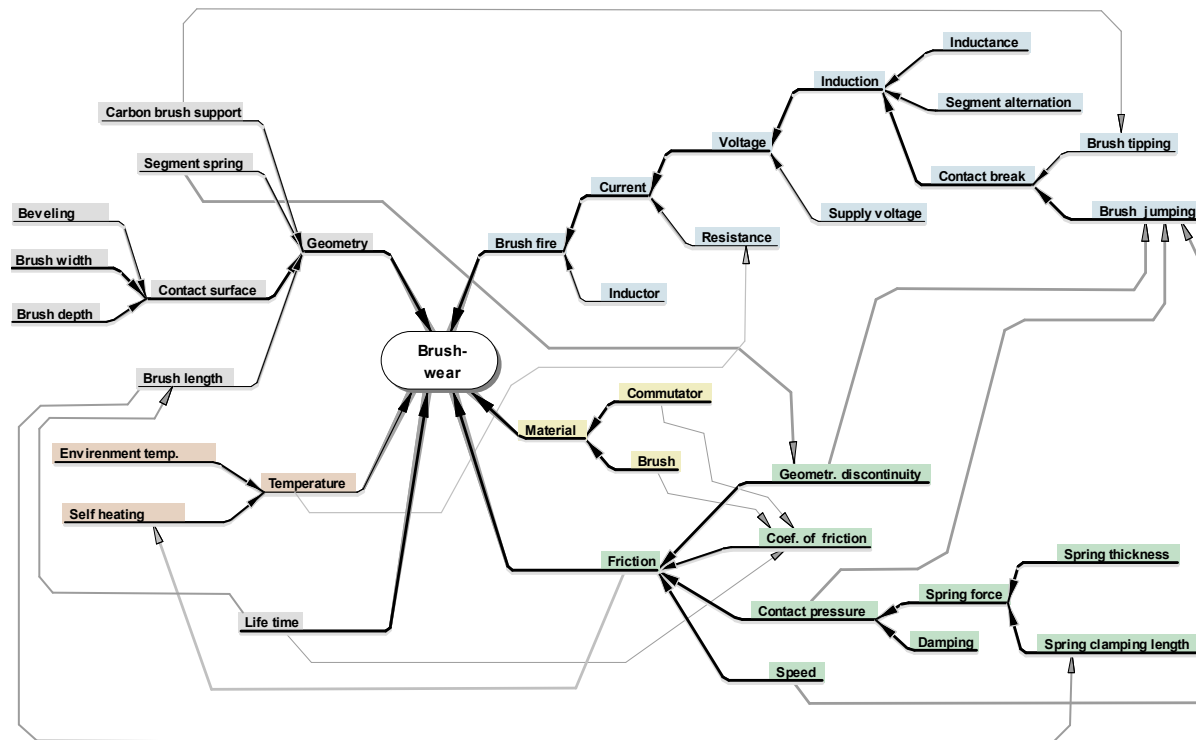
Continuous functionality – from the cause effect diagram to pareto evaluation to the experimental design.

A fault tree analysis can be derived from a cause effect diagram

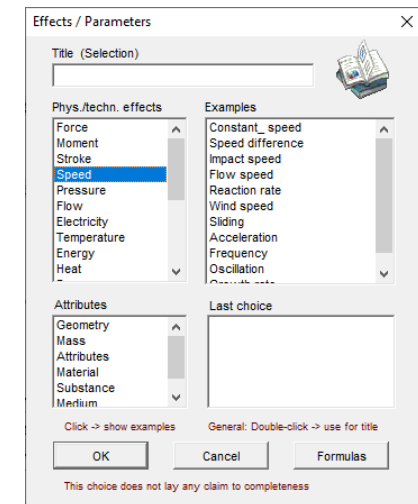
System analysis

The cause effect diagram can be evaluated and provides cross-links to the assessment of dependencies important to decide what needs to go into a design and what doesn't.

③



A parameter library helps to overlook anything



Fault-Tree-Analysis

The graphical FTA with powerful functions

Click to one of the elements and use the right button

See examples in menu *File, Templates, System-Analysis*

For more information read www.weibull.de/COM/Fault_Tree_Analysis.pdf

- All FTA elements also Vote-Gates
- Sub-Gates with layers
- Short-cuts
- Calculation of the critical path
- Probability from distribution or via a standardized FMEA table
- Import from text structure
- Export as FMEA form or cause-effect-diagram
- Supports new VDA/AIAG FEMA Handbook 2019

Defined from FMEA occurrence	Occurrence O
<input type="radio"/> P=0	0 ppm 1
<input type="radio"/> P=1E-6	1 ppm 2
<input type="radio"/> P=1E-5	10 ppm 3
<input type="radio"/> P=1E-4	100 ppm 4
<input type="radio"/> P=5E-4	500 ppm 5
<input type="radio"/> P=0.002	2000 ppm 6
<input type="radio"/> P=0.01	10000 ppm 7
<input type="radio"/> P=0.02	20000 ppm 8
<input type="radio"/> P=0.05	50000 ppm 9
<input type="radio"/> P=0.1	100000 ppm 10

* Analog FMEA handbook AIAG/VDA 2019 alternative table (A=1 => 0 ppm not in use)

Multiple Regression

The multiple regression is the most powerful analysis tool for the DoE results or historical data

①

Diagram Weibull **Evaluate** DoE Analyse Six Sigma

②

ANOVA **Regression** Discrete Hypothesis Capability

Analysis Guide...

- Multiple Regression manual ...
- Regression (straight-line) via diagram ...
- Multiple Regression full auto ...

C	D	E	F	G
abi	TrackPole	PistonPole	DampTube	Accel
5000	4750	210000	69000	9.49469
5000	4750	210000	69000	8.08628
5000	4750	210000	69000	7.23
5000	4750	210000	69000	6.67

Data Analysis Guide

Menu Data/Spreadsheet and open file:
Example_MulReg.xlsx

③

quantitative - metrical
continual data with sufficient resolution

More parameters
Multiple Regression or PLS

Discrete countable attributes
two or more characteristics

Countable characteristics
Transformation with arcsin

Lifetime
Transformation with ln(y)

Evaluate repetitions as mean and standard-dev.

Standard diagram regression

Matrix Plot

Correlation

Data analysis Multiple Regression

Menu Data/Spreadsheet and open file:
Example_MulReg.xlsx

Multiple Regression (Data tab):

Spreadsh-T table: T1

Data-columns: [Empty]

Response: Accel.

Unit: [Empty]

Indep. parameters: [Empty]

Reset

Unit: [Empty]

Dbt-click -> indep. param.

OK Exit Back Next

Multiple Regression (Model tab):

Model:

- ☒ Linear
- ☐ Interaction
- ☒ Quadratic
- ☐ Quadr. only
- ☒ Cubic
- ☐ Cubic only
- ☒ x 4

Parameter scaling:

- ☐ Normal
- ☒ Standardize-1
- ☐ Standardize to s

Regression:

- ☒ MLR (standard for experiments)
- ☐ PLS (for high correlating data or missing ratio)

Model: [List of terms]

OK Exit Back Next

Multiple Regression (Regress. tab):

Terms	28/16	MLR	PLS	Coefficient	p-val
Constant				5.013979	
StiffnRod				-1.16686	0
DampRod				-0.83833	0
Stabi				-0.47435	0
TrackPole				-0.24166	0
PistonPole				0.794462	0
DampTube				0.160125	0
StiffnRod*DampRod				0.60649	0
StiffnRod*Stabi				-0.11392	0.008
StiffnRod*TrackPole				-0.007545	0.955
StiffnRod*DampTube				-0.00597	0.886
DampRod*Stabi				0.01606	0.684
DampRod*TrackPole				0.039027	0.375
DampRod*DampTube				-0.17985	0
Stabi*TrackPole				-0.02574	0.52
Stabi*DampTube				0.001886	0.965
Stabi*PistonPole				-0.05134	0.215
Stabi*TrackPole				0.051293	0.197
TrackPole*DampTube				-0.09208	0.035
TrackPole*Stabi				0.09476	0.038
PistonPole*DampTube				0.021674	0.607
StiffnRod²				1.054252	0
DampRod²				-0.00611	0.96

R² = 0.985
R² adj = 0.979

OK

Speech bubble 1 (p-value):
p-Value
Error probability
Further infos use Help-button
The coefficient describes the importance in the model and the p-value is the error probability of this influence. It should be less than 0.05.
The actual p-value=0.265 means, that the model-term is not significant (bar is red) and should be excluded of the model

Speech bubble 2 (Coefficient of determination):
Coefficient of determination $R^2 = 1 - \frac{SS_{Res}}{SS_{Total}}$
Explanation quota of the model
Further infos use Help-button
The coefficient of determination R² indicates, which quota the regression model can explain the data.
The actual value R²=0.9846 shows, that there is only 1.5% unexplained rest of scattering. The result of the regression is good.

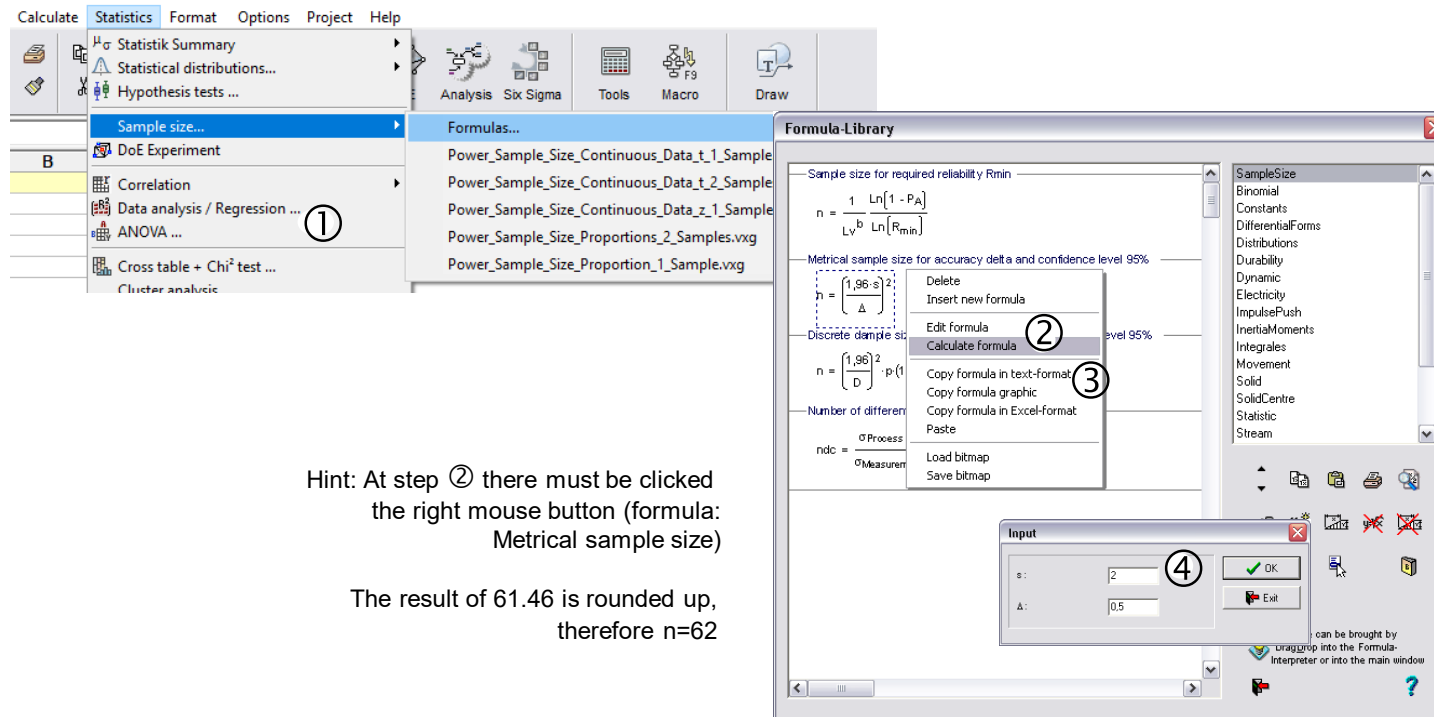
Detailed description under:

www.weibull.de/COM/Data_Analysis.pdf

Speech bubbles provide explanations of the properties and interpret the actual values

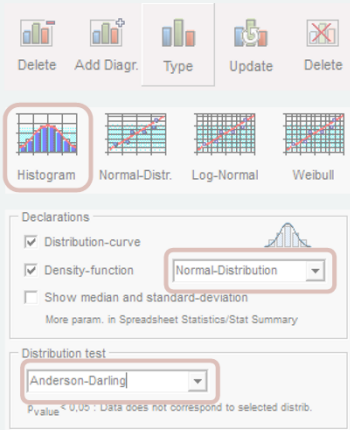
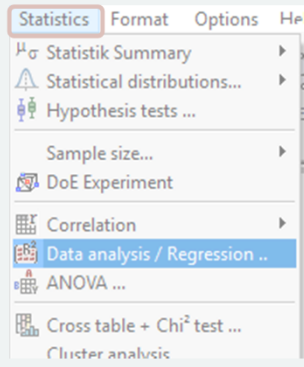
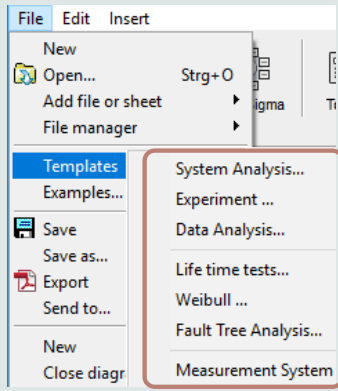
Calculation of a spot check size

Example car wash: The drying time of a varnish should be examined. It should be reached an exactness from $\pm 0,5$ hrs. The drying time has a standard deviation of 2 hrs. How big has to be the necessary sample size? The calculation can occur with the Calculator (view of the main window):



Examples for templates

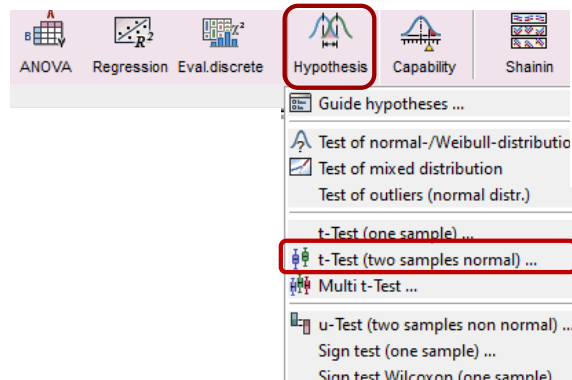
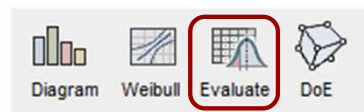
The other examples treat templates

Diagram-functions	Internal functions	Templates
<p>e.g. test of normality, hypothesis of equality with Boxplot or test of normality</p> <p>⇒ Select <i>Diagram</i></p> 	<p>e.g. calculation of distributions, DoE, regression, sample size, etc.</p> <p>⇒ Select menu <i>Statistics</i></p> 	<p>e.g. hypothesis-test, or Weibull-Analysis.</p> <p>⇒ Select menu <i>File/Templates</i></p> 

Statistical t-tests via templates

Hypothesis tests are available via templates

Open the Spreadsheet and the table where are the sub-groups of the Boxplots.
Mark column A and B.



Paste data in the yellow fields

	A	B	C	D
1	Data 1	Data 2		
2	167.2	184.1		t test
3				
4				
5				
6				
7				
8	188.9	193.3		beta-risk
9	192.4	196.5		power

Use "paste" for your data
(deletes the data from the example)
[Delete](#) [Paste](#) [Paste-Spec.](#)

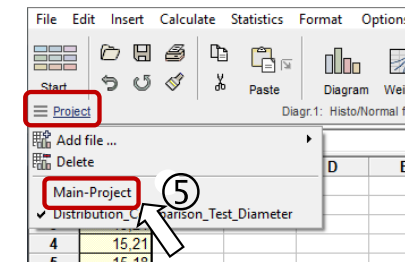


Start the macro for evaluation

t_test	4,71
t_crit	2,07
Significance	0,05
Mean 1	5,6667
Mean 2	7,3625
p-Value	0,000

The null hypothesis, that the means are equal, must be rejected!

The null hypothesis, that the variances are equal, can not be rejected.

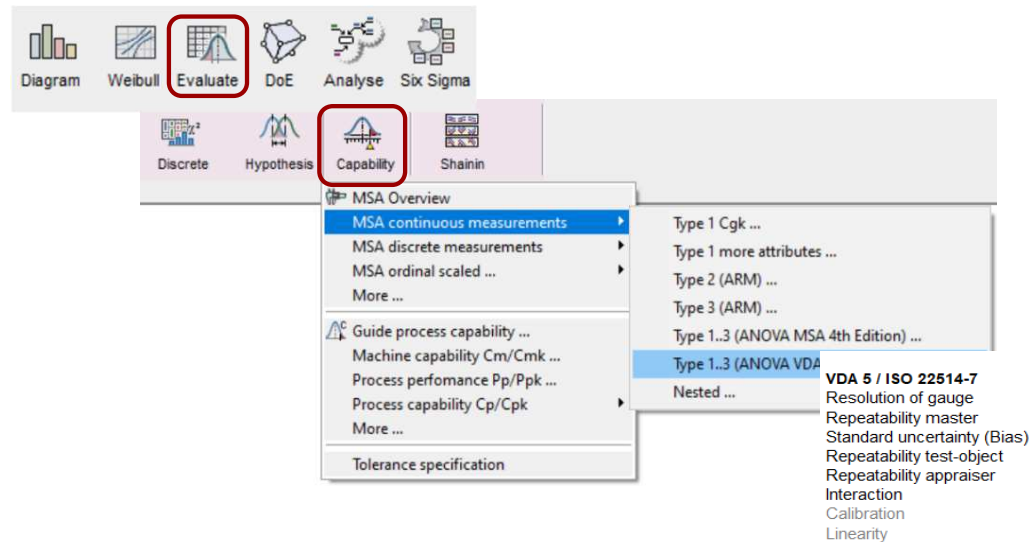


Note:

The template for the test is embedded in the actual project. To have a view to the previous representation and data select [Project](#) / [Main-Project](#)!

Measurement-System-Analysis

All important methods for continuous or discrete data are available



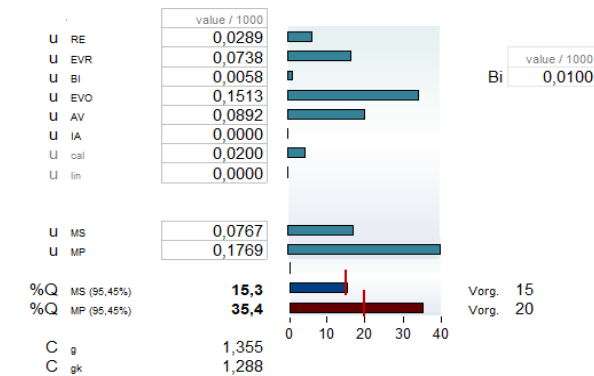
More information's:

www.weibull.de/COM/Measurement_System_Analysis.pdf

www.weibull.de/COM/Measurement_System_Analysis_discrete.pdf



- Supports VDA 5 or MSA4th edition Type 1,2 and 3
- ANOVA or nested ANOVA
- One sided tolerances or natural limits
- Supports AQDEF format for import
- Gage R&R, Bowker, Fleiss-Kappa, Kendal



Six Sigma - templates

For Six Sigma also powerful Excel and Visual-XSel templates are available

The screenshot displays the Visual-XSel 20.0 software interface. The 'File' menu is open, showing various options including 'Templates'. A secondary menu lists several Six Sigma templates, with 'Cpk_Sigma_Table.vxg' selected. To the right, a preview window titled 'Table for Cpk - values + overstepping reference values' is shown. This window contains a table with columns for Sigma, Cp, Cpk**, inside %*, outside %*, ppm*, and ppm-SS**. Below the table, there are footnotes explaining the asterisks and a normal distribution curve diagram illustrating the 'inside' and 'outside' percentages.

Sigma	Cp	Cpk**	inside %*	outside %*	ppm*	ppm-SS**
1	0.33	-	84.13	15.87	158655	691462
1.5	0.50	0.00	93.32	6.68	66807	500000
2	0.67	0.17	97.72	2.28	22750	308538
2.5	0.83	0.33	99.38	0.621	6210	158655
3	1.00	0.50	99.87	0.135	1350	66807
3.5	1.17	0.67	99.98	2.33E-02	233	22750
4	1.33	0.83	99.9968	3.17E-03	32	6210
4.5	1.50	1.00	99.9997	3.40E-04	3.4	1350
5	1.67	1.17	99.99997	2.87E-05	0.287	233
5.5	1.83	1.33	99.999998	1.90E-06	0.019	32
6	2.00	1.50	99.9999999	9.87E-08	0.001	3.4

* one sided without mean displacement
 ** one sided with mean displacement of 1.5 s

More information's at

<https://crgraph.de/en/search-index>

and

<https://crgraph.de/en/download/>

Contact: info@crgraph.de