KCmaster

MANUAL

VEIT CHRISTOPH

Intelligent Engineering Software

Table of contents

1. Introduction

**Digital structural analysis instead of pencil and calculator**

The functions of VCmaster are tailored to meet the special demands of engineers. Owing to the clearly laid out user guide both calculations as well as explanatory texts can be quickly and simply created in a single program.The input of mathematical formulae is implemented in natural notation directly into the document.Universal interfaces guarantee data transfer between different applications. The outputs of all programs can be accepted.

Software that could have been made just form me:

- Efficient
- Practice-oriented
- Innovative
- Compatible

Calculating, writing, compiling and reusing
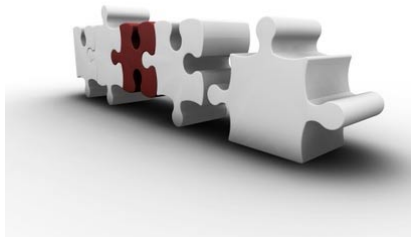
VCmaster is integrated seamlessly into the planning process. Generally established procedural methods allow the user fast and trouble-free access to VCmaster. Everyday tasks, such as documentation, calculation, compilation and the reuse of technical data and calculations are tackled with the integral concept of VCmaster. This unique concept increases the efficiency and the quality of the engineer's work: Changes are made easier, errors are avoided, calculations can be searched for and reused, and information can be digitally transmitted.

The functions of VCmaster are tailored to meet the special demands of engineers.

Apart from the standard functions for creating texts, the program is able to calculate formulas and tables automatically.

Benefits in brief

- Frequently recurring tasks are automated.

- Changes can be made considerably quicker.

- The documentation can be digitally archived and transferred. Each document can be used later as a template.

- The long-term advertising effect and image enhancement from the coherent look and feel of a structural analysis should not be underestimated.

- An efficient library with hundreds of ready-made calculation sheets for verification and details is provided.

- With its unique functionality VCmaster becomes an indispensable tool in the modern creation of structural analyses and other calculations. The editing time is reduced by 30 percent and more.

1.1 Technical calculations

Principle

VCmaster offers an intuitive software concept that allows engineers to perform calculations efficiently. Algorithms can be created quickly and easily without any programming knowledge. For retrospective modification of a default value the results as well as all dependent values are automatically recalculated and updated.

VCmaster forms the basis for quickly and conveniently solving, documenting and utilising recurring calculations.

Formulas

VCmaster independently determines the correlations between formulas and variables. This means algorithms can be set up without any knowledge of programming being required.

$$\frac{k_n}{\sqrt{h}*\left(\sqrt{\alpha*(1-\alpha)}+0{,}8*\frac{c}{h}*\sqrt{\frac{1}{\alpha}-\alpha^2}\right)}$$

VCmaster is proficient in all the mathematical functions of a scientific calculator. This also includes any number of bracket levels and exponentials.
VCmaster automatically interprets superscript characters, whereby special exponential functions are not necessary. In contrast to tabular calculations, the presentation of the formulae follows in precise mathematical form, which corresponds with the mindset of engineers.The readability of calculations especially for the testing and reuse of calculations by a third party is thereby significantly simplified.

VCmaster independently determines the correlations between formulas and variables. This means algorithms can be set up without any knowledge of programming being required. In this way, VCmaster builds a bridge between electronic and manual calculation. For many simple problems there are no data processing programs. VCmaster let's you write templates and use them like a program. Such electronic calculation sheets are considerably more efficient than handwritten calculations and, what's more, errors are avoided.

Stored tables

The looking up of technical parameters, material properties or parameters of components from tables is also automated. If required, the return values can also be interpolated

1.2 Sustained utilization

Reuse of knowledge

All documents and calculations created with VCmaster can subsequently be searched for, called up and reused. The software supports the creation and management of individual libraries with calculation templates. Text blocks and completed calculations are stored in these as templates. Intelligent search functions guarantee that for recurring calculations, supporting documents and explanations, the solutions for tasks which have already been contemplated and realised are swiftly located. The continuous dissemination and multiple use of important know-how is thereby secured. New documents are based on templates and compiled with a modular design principle. An immense saving in time results from this automation.

The unique integral concept increases the efficiency and quality of an engineer's work.

Template library

VCmaster contains hundreds of predefined macros. The templates, which are capable of making calculations, offer specific solutions for individual supporting documents and details in the fields of steel, timber, solid, composite, ground and masonry construction as well as mechanical and plant enginieering. All templates can be expanded, combined and adapted to individual requirements. Stored databases contain thousands of characteristic values for components, profiles, coefficients and materials. The determination of such calculation parameters is fully automated.
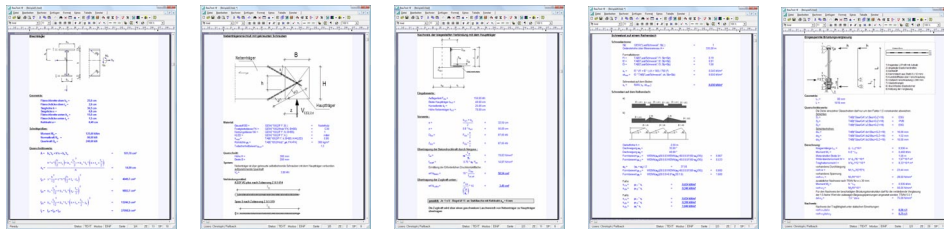
Future-oriented concept

The basic idea of VCmaster to draw up complete documentations in a single digital file is becoming increasingly important. Current trends, such as the formation of working groups or the employment of freelancers, require the digital exchange of information. Modern facility management already requires digital support structure planning. In the near future the concept of electronic building application will assume this.
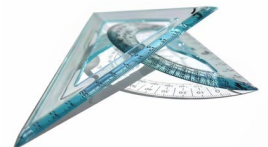
The unique t2W-Technology enables the output of all Windows programs to be adopted in a text program for the first time. This means our concept of administrating and editing complete structural analyses in a single general digital document is completed in an almost revolutionary way.

1.3 Compiling documents

t2W-Technology

t2W provides the engineer with an innovative tool that offers numerous new possibilities for technical documentation.

The interface is installed as a printer. This technology enables the outputs of the most varied programs to be compiled in a single document. The innovative nature of the technology is characterised by a text program that allows comments and calculations to be added in the simplest way. A full document is created, complete with page numbering, uniform headers and footers, table of contents, PDF export and much more.

The better way to PDF

The aim is still to create an electronic text document or a PDF file. Unlike conventional programs, a PDF file is created indirectly where, in the same way as PDF technology, t2W is installed as a printer driver. In contrast to PDF, t2W routes the print output to VCmaster. This has immense advantages if a document has to be assembled from several different sources. Only in this way can comments be added and a uniform layout achieved. The option to export to PDF format is included in VCmaster.

2. Calculations with VCmaster

More time for the essentials

Calculations can be carried out quickly and easily. The data are entered in natural mathematic notation. Our software automatically interprets the correlations between formulas and variables. If a standard value is changed, all dependent values are immediately recalculated. Material, component and cross-section values are automatically determined from stored tables. If required, the return values can be interpolated. This capability of our software lessens the strain on engineers for standard tasks and leaves room for the essentials.

VCmaster makes the engineer's or technician's pencil and calculator redundant. In contrast to handwritten paperwork, digital documents are always available and can be individually adapted by editing and adding comments. The flexible and dynamic computational VCmaster documents form the basis for a modern mode of operation in the engineering office. Similar calculations are used as drafts and reduce editing time by 30 % and more.

VCmaster makes the engineer's or technician's pencil and calculator redundant.

Important elements of the calculating component

1) **Variables**
2) **Querying stored table functions**
3) **Calculation lines**
4) **Graphic formulas as well as mathematical and logical functions**

2.1 Entering variables and formulas

2.1.1 Principle of the calculation lines

The input of calculation lines is made directly in the text program. It is quite sufficient to write a formula such as $M = q * l^2 / 8$ or $\tau = T_{eq} / W_t$ in any empty line and to call up the "*Calculate line*" function. Unlike spreadsheet calculation programs, no cells are required.
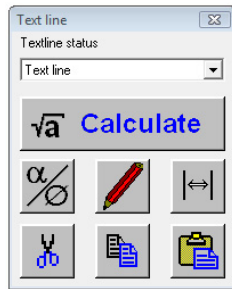
The calculation line can include a preceding text. The equals sign or the colon character separates this from the formula. The unit of measurement can be specified directly behind the formula and separated by a space character.

The program interprets the calculation line completely automatically. Units of measurement, format and decimal places are queried if necessary (it is essential to see Chapter 2.4). Dependent values are identified and calculated accordingly.

Graphic formulas

Graphic formulas should be used when the main emphasis is placed on the optical appearance (e.g. in complex formulas).
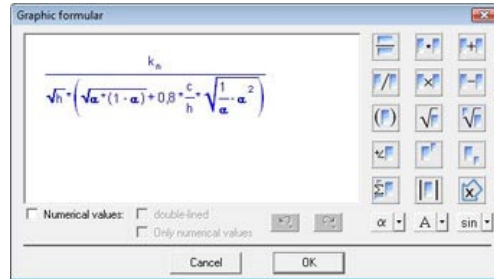
Graphic formulas and the inputs can be freely combined in the text program, i.e. only individual terms can be entered as graphic formulas.

Representation of formulae

2.1.2 Definition of variables

Numerical values or texts can be assigned to a variable.

Default values are assigned to a variable by writing the variable name with the relevant value into a blank line (e.g. D = 100 mm) and calling up the *Calculate line* function (see above). A numerical value or text can be attributed to a variable.

If specified, Results of calculation lines, summations or the *Result single-lined/right* function are automatically assigned to a variable. The expression that appears before an equals sign or colon character is automatically interpreted as a variable.

VCmaster identifies all dependencies automatically. If a value is changed, the program recalculates the relevant lines. This feature enables calculation algorithms to be formulated without any knowledge of programming.

Validity of the variables

The specification that was made last is definitive. If the same variable is specified a second time, the new value is then applied from this point on.
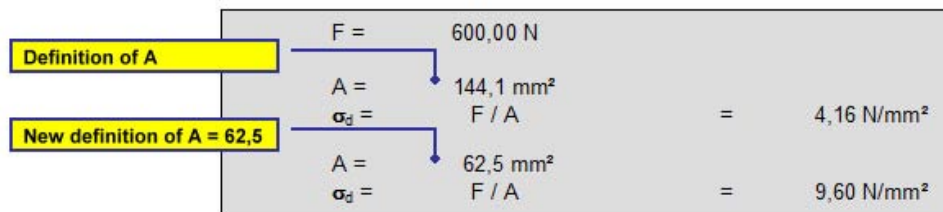
Variable names

- can be any length and must always begin with a letter,
- must only contain numerical values and characters (including Greek characters and umlauts); The following special characters are allowed: full stop, comma, infinity, underline and square brackets.
- Non-admissible characters in variable names include, e.g. superscript characters, round brackets, semicolons and mathematical operators. These variables cannot be interpreted mathematically (e.g. h² =; b/2 =; X(20) =).
- Normal and subscript characters are <u>not</u> differentiated (h1 = h_1)

Examples

- Specification of a variable:
  D =   10 mm

- Text variable (e.g. for materials and database queries):
  Selected bolt =   "M12"

- Formula without text:
  F / A   = 10.00 N/mm²

- Formula with text (terminated by an equals sign) and variable allocation:
  Stress σ_v =   Re * a / 100   = 846.00 N/mm²
  max. moment M = q * L² / 8   = 5.56 kNm

- Graphic formula with variable allocation (k_{90}):

  Coefficient k_{90} $\qquad \dfrac{k_n}{\sqrt{h} * \left(\sqrt{\alpha * (1 - \alpha)} + 0{,}8 * \dfrac{c}{h} * \sqrt{\dfrac{1}{\alpha} - \alpha^2} \right)}$ $\qquad$ = 0.59

Simple example from structural analysis:

Explanation

The variables l_k and d_p have been specified by the user. d_p is already used
in the calculation of the dead load. All results are automatically determined.
For further calculation g, p, q_D and M and Q can, in turn, be used as variables.

2.2 Input tools for formulas

2.2.1 Graphic formula editor

The graphic formula editor can be used to create visually attractive formulas. It should be used when the focus is on the appearance.

The input is made on the left side in natural mathematical notation. The input is controlled or the formula extended with the buttons on the right side. Using the Variable list all available variables can be displayed and pasted. Graphic formulas can be used in the text without having to use the calculating functionality.
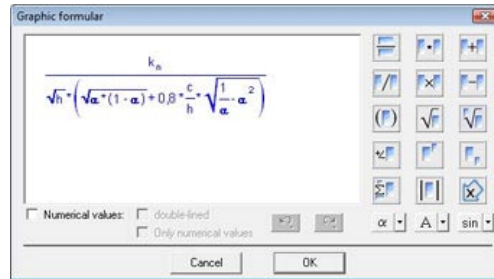
The user can select various display options:

- **Standard**: The formula is displayed with the aid of variables.
- **With numerical values**: Either the variables and the numerical values or just the numerical values are displayed. If both are displayed, it is possible to determine whether the formula is displayed on one line or two. The latter is recommended or may even be necessary for long formulas.

Graphic formulas can be used in the text without using the calculating functionality.

Input

On the left side a placeholder is preallocated (small blue box). The input of variables and numerical values can begin directly via the keyboard**.**

The input of a term is terminated with ENTER or with an arithmetic operator. The "**+**", "**-**", "**✗**" and "**/**" keys automatically create new terms. This enables quick input.

In addition, the key combinations **CTRL+D** for subscripts, **CTRL+E** for superscripts and **CTRL+T** for the square root function simplify the input.

IMPORTANT: After completing the input of a term, the **cursor keys** can be used to navigate in the formula editor.

More complex formulas are created quickly and simply with the buttons on the right. For very complex formulas, it is recommended to set up the basic structure first. Begin with the root function sign, for example, and the essential fraction strokes. Then fill in the placeholders.

Greek characters and trigonometric functions are inserted using the lower selection buttons. Incorrect inputs can be cancelled with the upper arrow buttons.

Summation
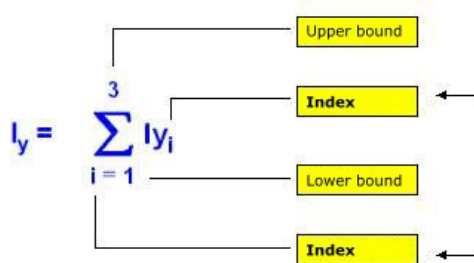
The entry of a total corresponds with the mathematical rules.

Note: **The index must be identical with the index of the variable**.

$$I_y = \sum_{i=1}^{3} Iy_i$$

Labels: Upper bound, Index, Lower bound, Index

Editing and extending formulas

The graphic formula editor was designed to provide optimum operating comfort and rapid input of formulas. Elements and terms are selected by clicking with the mouse. A term is selected by clicking on the associated operator.

Example 1:
You have already entered $a^2 + b^2$:
Now click on the "+" character:
The formula is marked. Now you can insert the root function (with the right button or CTRL+T):

$$\sqrt{a^2 + b^2}$$
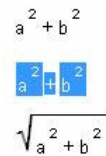
Example 2:
You have entered $a + b + c$:
Now click on the second "+" character:
Click on the first "+" character, $a + b + c$ is marked:
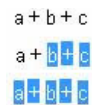
2.2.2 Input via the variable list
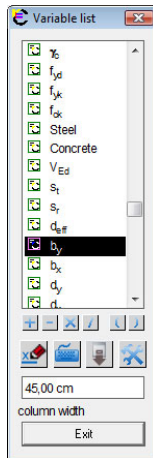
The writing of formulas is somewhat arduous for index-related notations. The variable list provides effective assistance here. All variables available at the current text point for further calculation are displayed. The variables can be selected and compiled into a new formula. Indices are taken into account and do not have to be entered again. Brackets and arithmetic operators can be clicked directly. It is also possible to write parts of the formula in the text and to extend it by means of variable list (or vice versa). A variable is selected per mouse click. It can be transferred into the document with a further click on the left or right mouse key. The Insert button has the same function. Arithmetic operators and brackets are written by simply pressing the relevant button. To switch to the VCmaster input, please use the middle button. The variable list is closed with the Exit button.

Function:
1. Write variable
2. Enter into VCmaster
3. Extend list
4. Setting

The value of the variable is also displayed in the lower area. If a descriptive text was entered before the variable, this is also displayed. Consequently, the variable list is extremely well-suited for checking values.

2.2.3 Toolbox for a calculation line

The toolbox shown on the right is a convenient solution for editing and formatting calculation lines.

The following functions are available:

$\sqrt{a}$ Calculate line

Display values of the variables (figure on the left)

Adopt the tab setting of the calculation line

Calculator

Change the unit of measurement and decimal places

Insert an empty line Alternative: Context menu for calculation line

2.3 Mathematical functions

2.3.1 Trigonometric and logarithmic functions

VCmaster is proficient in all mathematical functions of the scientific calculator including any levels of brackets and exponentiation.

sin	cos	tan
asin	acos	atan
sinh	cosh	tanh
log	ln	abs

The function descriptions can be entered directly or called up via the menu. In the second case VCmaster writes "SIN()", for example. The cursor is automatically located between the brackets so that the function value can be entered. A numerical value or a variable can be specified as a function value.

All functions can be interlinked, i.e. a function value can also contain a function call (nesting; see Examples).

The VCmaster TechEditor can interpret superscripted characters so the expression X^2 (written with ALT GR+2 *) is equivalent to the representation X^2 (written with superscripted 2). $X^{1/3}$ will also be correctly evaluated. Hence, special exponential functions are not required.

Of course, the usual mathematical rules apply. If an equation cannot be resolved, the program outputs the relevant error message. Calculation continues with the number of decimal places that were specified which means if a higher accuracy of calculation is required, please increase the number of places after the decimal place.

Examples

Trigonometric function:

Width b =		200.00 mm
Angle α =		45.00 °
Height h =	b * SIN(α) =	141.42 mm

Exponentiation (automatic interpretation of superscripted fields):

X =	$1/(\varphi+(\varphi^2-\lambda^2)^{0,5})$	0.8083

Exponentiation (ALT GR+2 * or ALT GR+3 key):

Width b =	10.00 mm	
Height h =	20.00 mm	
I =	b * h³ / 12	6666.67 mm⁴

2.3.2 Logical functions

Functions such as ABS(), MAX(), MIN(), IF(), AND, OR are realised. If there are several arguments, they are separated by semicolons.

The IF function consists of three elements: the condition, the formula or the value that is to be used if the condition is fulfilled, and the formula or the value that is relevant if the condition is not fulfilled.

$\beta =$ IF(d > 25; 1.00; 0.75) $=$ 0,75

| Condition | | | Value, if the condition is not met. |
| Value, if the condition is met. |
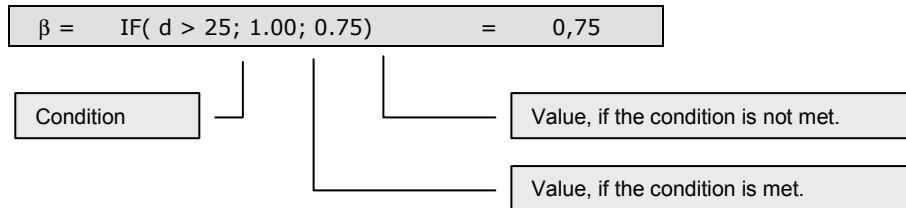
In the IF function all common operators "=" , "≠" , ">" , "<" , "≥" and "≤" are permissible. Text variables can be compared although only numerical values are permissible as the result.

The IF function is resolved from right to left. Hence, it is sensible to work with brackets in operations.

Examples

IF function (read: if; then; else):

D =	55.00 mm	
k =	IF(D≤32; 1; 1 - 0,26*LOG(D/32)))	= 0.939

IF function (nested):

d =	20 cm	
b =	IF(d>25; 1;WENN(d>17.5; 0.9; 0.75))	= 0.90

Example with text variables:

Steel =	"S355"	
Re =	IF(Steel="S235"; 235; 355)	= 355.00 N/mm²

Example showing different brackets (bold) and the results:

A =	15	
B =	30	
IF(A < 10 AND B < 20 OR B > 25; 1; 0.80)		= 1.00
IF(**(**A < 10 AND B < 20**)** OR B > 25; 1; 0.80)		= 1.00
IF(A < 10 AND **(**B < 20 OR B > 25**)**; 1; 0.80)		= 0.80

Examples of MIN()- / MAX() function:

F1 =	150 N	
F2 =	200 N	
$F_{MAX} =$	MAX(F1; F2)	= 200.00 N
F_{MIN}	MIN (F1; F2 * 0.50)	= 100.00 N

2.3.3 Summation and Absolute value function

Both functions are entered in the graphical formula editor.

The entry of a total corresponds with the mathematical rules.

Note: The index must be identical with the index of the variable.

$$I_y = \sum_{i=1}^{3} Iy_i$$

Upper bound	
Index	
Lower bound	
Index	

The example shows the following summation:
$I_y = Iy_1 + Iy_2 + Iy_3$

Rules:

$$\sum_{k=m}^{n} (a_k + b_k) = \sum_{k=m}^{n} a_k + \sum_{k=m}^{n} b_k$$

$$\sum_{k=m}^{n} \lambda \cdot a_k = \lambda \cdot \sum_{k=m}^{n} a_k$$

$$\sum_{k=m}^{n} a_k \cdot b_k \neq \sum_{k=m}^{n} a_k \cdot \sum_{k=m}^{n} b_k$$

2.4 Formatting calculation lines

2.4.1 Formats of calculation lines

An essential feature of the VCmaster TechEditor is that calculation lines are automatically formatted. As in any other Windows WYSIWYG* program, this is done by means of tabs. (* what you see is what you get).

Structural analysis calculations contain a wide range of calculation lines that need to be formatted completely differently. The formatting of a long formula looks completely different from the definition of a variable or that of another calculation line, for example. Hence VCmaster works with eight standard formats (see Chapter 2.9). These are used to control the placement of the formula and of the result depending on the task. The standard formats can be set up by the user.

So that VCmaster can interpret the calculation lines, the results of the lines are bracketed. These brackets must not be deleted or edited because otherwise VCmaster may no longer interpret the lines as calculation lines. For copying, deleting and cutting, these brackets must be complete. Hence, plausibility checks can be carried out by the program. The brackets can be displayed:

Querying the unit of measurement and line format

If there is a tick in front of *Calculate - Automatic for line format - Units and format query*, the line format, the unit of measurement and the numerical value of the decimal places are queried each time new input is entered. To make changes, please use the right mouse key function, *Modify units.*

The list of units of measurement can be edited. For details, see Chapter 2.9.

2.4.2 Automatic alignment and formatting
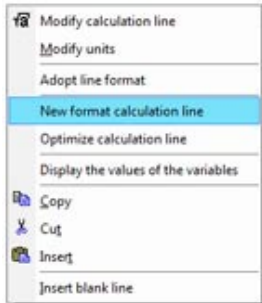
The user specifies the criteria according to which the calculation lines are to be formatted. The following options can be set:

Align arithmetic line and/or block automatically: If this option is set, VCmaster aligns a new calculation line according to the preceding one. If that is not possible, the program asks whether the whole block should be aligned with one another. If a new calculation line is inserted in a block or in a summation, this is automatically formatted according to the preceding or subsequent line (activation is recommended).

The user can select three grades for automatic alignment and formatting:

- **Fully automatic**: VCmaster determines the most sensible format and places the calculation lines accordingly. We recommend this option for beginners or for users who want to take advantage of the full comfort of automatic alignment and formatting.
- **Semi-automatic**: The user specifies a desired format. VCmaster checks this and corrects it after a query. Recommended for experienced users who want to influence the formatting and design.
- **Predefine manually:** Switches off automatic alignment and formatting. Only recommended in exceptional cases.

Three procedures are available for the automatic alignment and formatting:

- **Space-saving:** All calculation lines are placed as closely together as possible. This is only recommended if there are space problems due to very long.
- **Prefer standard formats:** The program selects the most sensible standard format. Recommended for users who want a more compact display of shorter formulas.
- **Possibly similar:** VCmaster tries to place the equals sign at the same point of every line. Decisive here is the standard format which specifies the greatest distance to the equals sign. Note: In the case of very long formulas, it is possible that the equals sign may have to be moved.

An entered formula can be automatically converted into a graphic formula. Various options are available for this (see also Chapter 2.2):

- **Standard**: The formula is displayed with variables.
- **With numerical values**: Either the variables and the numerical values or just the numerical values are displayed. If both are displayed, it is possible to determine whether the formula is displayed on one line or two. The latter is necessary for long formulas.
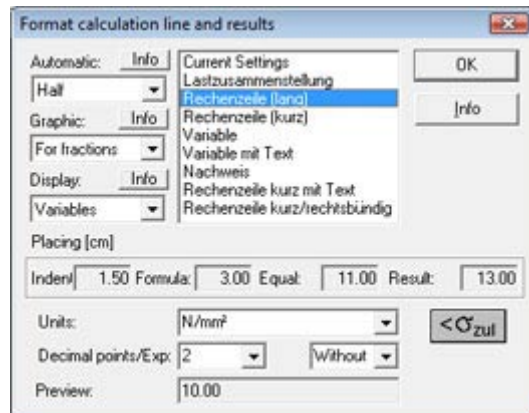
2.4.3 Retrospective formatting of calculation lines

Align

Several calculation lines can be aligned to each other retrospectively. The context menu is best suited for this. Procedure:

1) **Mark**: Roughly mark the block from the first to the last calculation line and click with the right mouse key (see first figure).

2) **Select function**: Either *Align calculation line* or *Optimize calculation line*. The latter minimizes the space requirement (recommended for long formulas).

3) **Exit**: Confirm the function. If alignment is not possible, appropriate error messages appear. This can be the case, for example, if short formulas with long text are to be aligned with long formulas with short text. This constellation often results in a print width that exceeds the paper width minus margins. In such a case, it is a good idea only to align lines that are similar in structure.
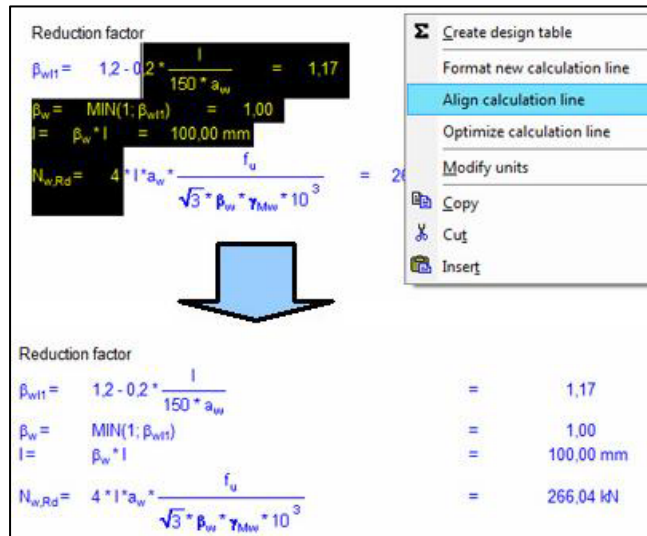
Reformatting

Please mark the lines as described above. Then select the *Format new calculation line* function. The following dialog appears:

Alternatively, the toolbox is available:
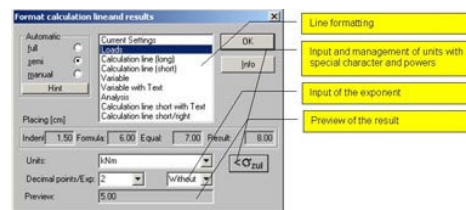
Calculate – Calculation line format-Format new calculation line

Shift+F12

CTRL+F12
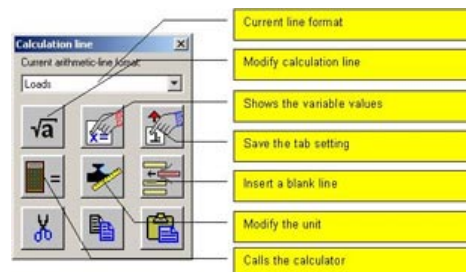
2.5 Changing variables and formulas

2.5.1 Changing calculated lines

Calculation lines are blocked. There are several options for changing:

- **Double-clicking on a numerical value**. This is sensible if only this value is to be changed (see above).
- **Right mouse key - Modify line** (see figure on the right) or *Calculate – Calculate / modify line* menu function if the formula is to be changed.
- Via the **Toolbox** (far right).
- During the editing, the calculation line and all lines dependent on it are **shown in red**. Non calculated lines are marked with a "#".
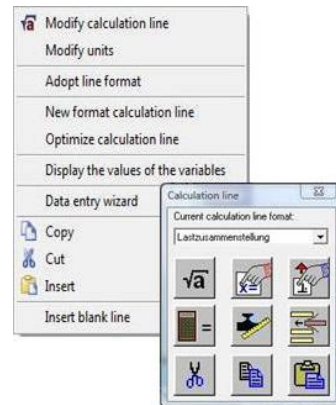
2.5.2 Changing graphic formulas

Graphic formulas are changed with a **double-click** on the formula (see figure on the right). This process is recommended.

18
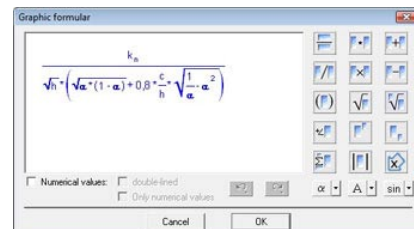
2.5.3 Data entry wizard to change several input values

To change several entries simultaneously you can use the data entry wizard. This automatically determines the variables in a selected area. Additionally the first graphic is shown in the area being viewed.

The data entry wizard offers the user various benefits:

- The default values for an area are calculated automatically and centralised in a clearly arranged entry mask.

- When changing several parameters, subsequent calculation is considerably faster than when changing each individual calculated line.

- The graphic illustrates the entries.

- In this way calculation templates can be used in almost the same way as a program.

Principle

All values which are clearly recognised as being default values are displayed. That is, entries with direct value assignments and the results of the *Selected* functions *(SEL)*.

Note: Selected functions are only included in the dialogue if they depend on entries within the selected area. In other cases, the selection of parameters, such as components, materials, etc., in the data entry wizard makes no sense.

Call-Up

The data entry wizard can be called up automatically during various actions:

- **When pasting** from the *Template Explorer*, from a reference project or from the review window. For this, see section 3.1

- **When copying** and pasting via the clipboard

The automatic call up of the wizard can be activated or deactivated. This is done either in the dialogue (see illustration above) or in the *Calculate* menu - input *wizard*.
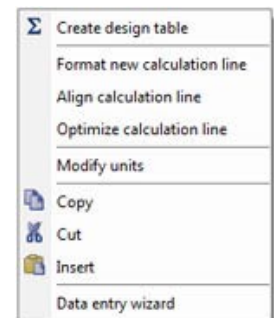
The manual call up is facilitated:

- using the **program menu** *Calculate - Data entry wizard - Start*

- using the **Context menu** (right mouse button). This appears when the cursor rests on a title or when an area is selected (see illustration to the right).

- using the **ALT+ENTER** key combination, when several calculated lines are selected

2.6 Tabular calculation

2.6.1 Adding up calculation lines

The results of a number of calculation lines are added via *Calculate – Sum of calculated lines - Create*. The format and unit of measurement are taken from the last calculation line of the table. The nesting of several additions is not possible.

The result can be assigned to a variable. The text before the table result is automatically queried and can be freely selected. This variable can be changed at any time (see below).

If calculation lines in the table are deleted or changed or lines are copied into the table, the result is automatically adjusted. All calculations that depend on the result are updated.

Example

Width b =			0,24 m
Depth h =			0,55 m
Actions on span:			
from dead load:	b * h * 25	=	3,30 kN/m
from nib:	b * 1,35 * 25	=	8,10 kN/m
from Pos. 201:			48,50 kN/m
		max q_{gf} =	59,90 kN/m

Generating a sum total

- **With the mouse:**
  Mark the lines and the Sum of calculated lines call in the context menu (right mouse key).

- **Via the keyboard:**
  Call of the *Calculate – Sum of calculated lines - Create* function. So that the program can assign the table function when using the F12 hotkey, a blank line must be inserted before the first and the last calculation line.

Changing a sum total

- **Dissolving the table function:**
  Click on the result and call up the *Dissolve table* function in the context menu.

- **Changing a text or variable:**
  It is easiest to click on the result and to call up the *Text before result* function in the context menu.

2.6.2 Result single-lined/right

This function was primarily realised to individually right-justify specified values and optically adapt a sum total. It can, however, also be used to enter variables as right-justified (see Example 1).

After the input, this line is also blocked but can be activated and modified via the context menu with M*odify calculation line* or with ALT+ENTER.

Example 1

$$\text{Width } b = \qquad 10,00 \text{ mm}$$
$$\text{Height } h = \qquad 20,00 \text{ mm}$$

$$\text{Cross-sectional area } A = \qquad h * b \qquad = \quad 200,00 \text{ mm}^2$$

$$\text{Moment of inertia } I = \qquad b * \frac{h^3}{12} \qquad = \quad 6666,67 \text{ mm}^4$$

Example 2

Actions on span:

from dead load:	b * 25	=	6,00 kN/m²
from Pos. 201:			1,50 kN/m²
	max q_{gf} =		7,50 kN/m²
	live load q_{qf} =		5,00 kN/m²
q_d =	1,35 * q_{gf} + 1,50 * q_{qf}	=	17,63 kN/m²

Sum of calculated lines

Result single-lined/right

Normal calculation line

2.6.3 Calculate - Table functions

The addition of calculation lines mentioned above is often sufficient for simple calculations.

But the classic tabular form is often more space-saving and more clearly arranged. Of course, we did not want to develop a new spreadsheet program. The aim was to provide an efficient tool to support the compilation of cross-section values, stresses and strains in tabular form. In addition, the integration of such table functions was realised within the existing calculation concept. The results can be used for further calculations.

Set calculation table

After point:
- Without
- 1-digit
- (•) 2-digit
- 3-digit
- 4-digit

Alignment:
- (•) Keep
- Left
- Right
- Centered

Info   OK
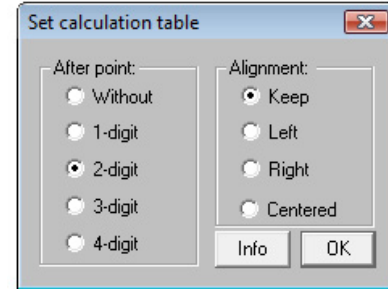
Calculate-Arithmetic table-Define

Note:
The results can be used for further calculations.

Principle:
In a table a mark is set. At the same time, the number of decimal places that the results should have and how the columns should be arranged is determined (see figure on the right).

Example 1

Example 1: Simple Sum

±	W1	W2	W3
Upper floor	22+15,00	25+12,50	15+8,75
First floor	15	17	16
Basement	18	18	15
	$W_1 = 70,00$	$W_2 = 72,50$	$W_3 = 54,75$

$W_{ges} = W_1 + W_2 + W_3 \qquad = \qquad 197,25\ kN$

Sum of column (with mark)

calculation with the results

The mark which defines the arithmetic table

Example 2

Example 4: Combination of stress

Load scheme	±	0,1 L	0,4 L	1,0 L
Dead load	g_d	125,00	635,25	-1250,52
Covering	g_{1d}	88,50	187,50	-425,00
Prestress	v_d	-280,58	-1185,00	1940,00
Live load	q_d	62,50	300,25	-450,00
$g_d + v_d$	$= g_d + v_d$	-155,58	-549,75	689,48
$g_d + g_{1d} + v_d + q_d$	$= g_d + g_{1d} + v_d + q_d$	-4,58	-62,00	-185,52

The principle

In a table a mark is set. At the same time, the number of decimal places that the results should have and how the columns should be arranged is determined (see figure on the right).

The expressions for the calculating component can be written in the lines and columns behind or below this mark. While doing so variables and formulas are defined. Formulas begin with a "=" (see below).

Example of arithmetic expressions

	Length	Area	E-Mod	Compliance
	[mm]	[mm²]	[N/mm²]	[10⁻⁶ mm/N]
±	L	A	E	=10^6*L/(E*A)
Bold head	0,40*16	π *D² /4	E	0,152
Shank	26	π *D² /4	E	0,616
Non bolted thread	26,4	144,1	E	0,872
Length of engagement	0,50*16	144,1	E	0,264
Female thread	0,40*16	π *D² /4	E	0,152
				δ_s = 2,056

Note: The arithmetic expressions can be suppressed on a printout. All values can be changed on the keyboard or by double-clicking.

Unlike classic spreadsheets, in VCmaster a formula applies to a whole line or column of a table. Any arithmetic expressions and formulas can be entered in the table cells to the right of or below the mark. These can even contain variables of the calculating component. For more details, see the variables D and E in the example.

The explanations may sound a bit complicated but the procedure is simpler and quicker than in a conventional spreadsheet because the definition of a formula for each cell is not required. After one or two test tables, the input is usually intuitive.

Sum, minimum and maximum of lines and columns

Results of the arithmetic tables can be added line by line or column by column or the minimums or maximums can be determined. These totals can be used for further calculation. To do so, a mark must be set in the corresponding cell:

Example 2: Stress

W_o = 1000,00 cm³
W_u = 1200,00 cm³

loading condition		Stress on top		Stress below	
	±	so	=so	su	=su
uniformly distributed load	g	1210 /W_o	1,21	800 /W_u	0,67
Live load	q	500 /W_o	0,50	450 /W_u	0,38
Sum			σ_o = 1,71		σ_u = 1,05

Result of the column

Formula for calculation of so

calculation instructions

The mark which defines the arithmetic table

Variables as calculation lines

Notes on design

Table-
Frame and shadowing

Headings and units of measurement are usually specified before the expression (see Examples). If the expressions are hidden, it is sensible to specify headings explicitly. For simple cases it is sufficient if the expression is used as a heading. Please note that either all arithmetic expressions or no arithmetic expressions within a document are hidden. Therefore, please do not mix different practises.

The lines are drawn with the *Frame and Shadowing* function (see right). The function can be called up via the context menu.
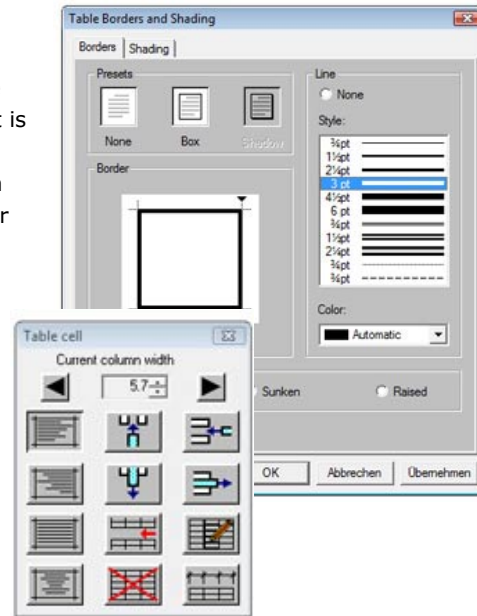
2.6.4 Integrating spreadsheet programs

Tables that have been created with other programs can be integrated using OLE technology. The precondition is that the program is OLE-compatible which is normally the case with standard software.

Insert-Object

Note:
Further information about the OLE interface can be found in the chapter "OLE interface".
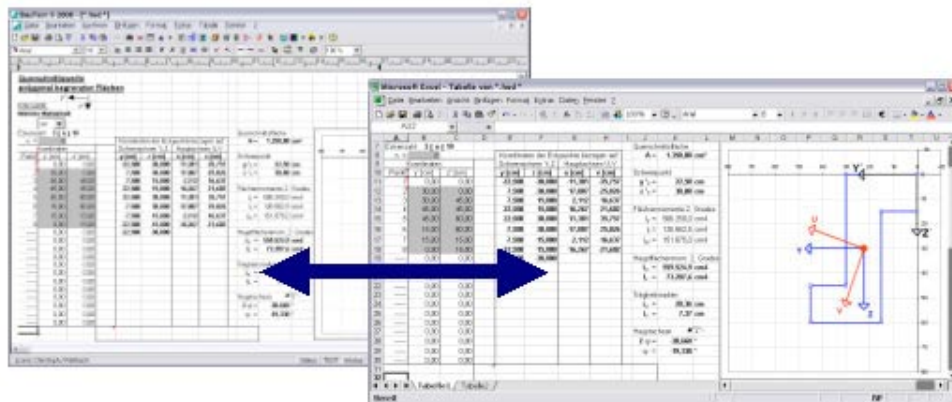
Example: Displaying an EXCEL* calculation (right) in VCmaster (left):

* EXCEL is a registered trademark of Microsoft Inc.

2.7 Stored tables / Database queries

2.7.1 Principle procedure

Parameters for components, profiles, coefficients and materials are saved in databases. Looking up such values in the literature is often time-consuming. VCmaster takes over this task for you. If required, the return values can be automatically interpolated.

A database table is automatically linked with the document via the TAB() or SEL() function. Unlike the TAB() call, in SEL(), it is not the first applicable expression that is set but a list of all possible return values that fulfill the conditions is displayed. This is particularly useful in the selection of components or materials. The syntax of the input is identical. If no return values are found, an error message appears. In German templates, GEW() is used instead of SEL().

The user specifies search criteria which VCmaster applies to read the desired values from the database. You can specify a description, for example, and the desired dimensions and properties will be searched for. In other cases, dimensions are specified and the required component is automatically determined.

Extras-
Manage database

Note:
Parameters for components, profiles, coefficients and materials are saved in databases.

The TAB or GEW() request can be hidden when printing. See Chapter 2.9 for more information.

Example

Through the use of variables, the query design is very flexible. In the example mentioned above, it is sufficient to change "HEA" to "HEB" and VCmaster looks for the required profile in the HEB series.

Input

$f_{ck} =$ TAB("concrete/EC"; fck; Name="C30/37") $=$ 30,00 N/mm

Name of the Database Group/Name

Condition (any number you like)

Searched value

- **Database description:** This describes the group and name of the database. The elements are separated by a slash, e.g. "Memory group/Memory name".

- **Searched value:** Information that should be taken from the database.

- **Conditions:** One condition consists of the table variable, the operator and the comparative value. The table variable is at the first position and must correspond to the description in the database (WS in the example). The following characters can be used as operators: "=" , ">" , "<" , "≥" , "≤". The comparative value is in the third position ("St44" in the example). This can be a text, a formula, a numerical value or a variable. Of course, it only makes sense to specify a text as a condition if the column of the database contains a text. Equally it applies that, when specifying a numerical value in the database, numerical values are saved under these variables.

- **All data are separated by semicolons**. Greek characters must be written out in full in the database entry (e.g. **ß** = beta). In the query, they can be specified as Greek characters. Subscript indices are replaced by normal text (example: b1 corresponds to the table variable b1).

Selection with SEL() function:

double-click

Profil: SEL("Steel/Profils"; Name;) = HEA
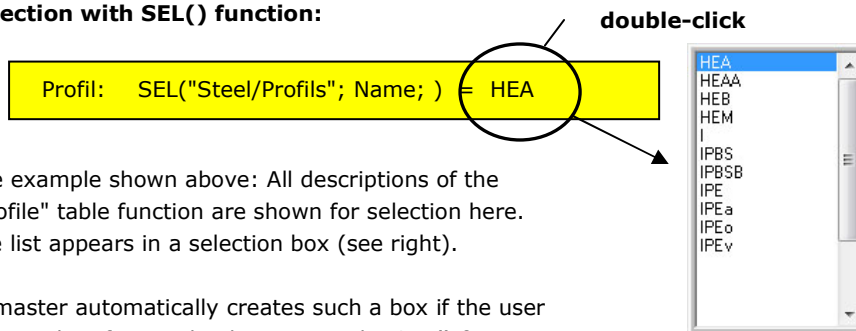
See example shown above: All descriptions of the "Profile" table function are shown for selection here. The list appears in a selection box (see right).

VCmaster automatically creates such a box if the user queries data from a database using the SEL() function. To change specified values, please select the result with a double-click.
Special case with SEL(): If the conditions are omitted, all entries of the database are suggested. Please put a semicolon after the second argument.

Very important: An efficient and correct application of the databases is only possible when the contents of the database table are known precisely during the text input. You need to know the exact description of all values transferred. Either use our overview of the database tables in PDF format or call up the data with *Extras, Manage database*.

2.7.2 Assistant for TAB() and SEL() function

This tool assists the user in creating a database query using the TAB() or SEL() call. The queries are worked through in order and the program lists the possible default values in drop-down windows.

Select *Next* to change to the next input. With *Back*, prior input can be modified again. *Finish* concludes the input. With TAB() the function is only possible from the third argument, with SEL() the function is already possible after the second argument (case: no conditions specified).

1) Table selection:
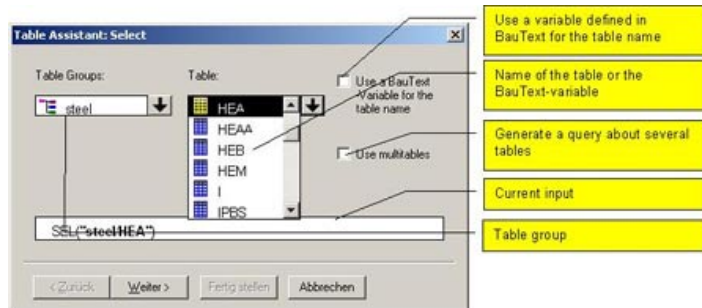
2) Specify searched for return value:

3) Specify conditions:
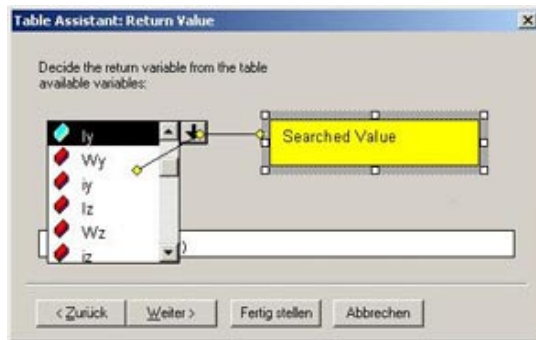
2.7.3 Special case, multi-tables
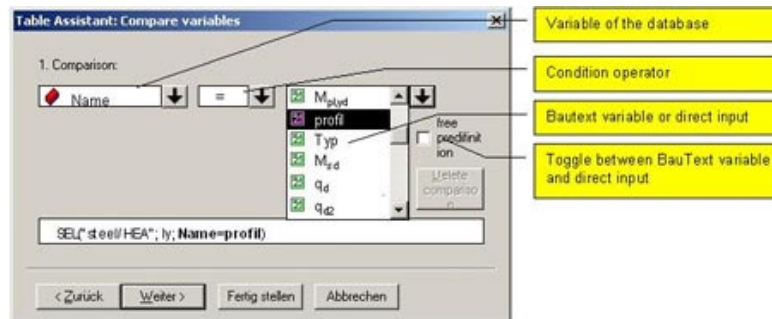
**Calculate-
Database links-
Assistant for assume-
function**

Principle:
In multi-tables several
tables are combined
into a group

In multi-tables several tables are combined into a group. The queries then no longer apply for just one table but for all tables combined in the group. This makes sense if comparable components are saved in several database tables (e.g. steel profiles).

The query is only useful and possible in conjunction with the SEL() function. A further condition is that all variable designations used in the tables of the group are identical. The input and administration of multi-tables is carried out under *Calculate - Assistant for assume-function*.
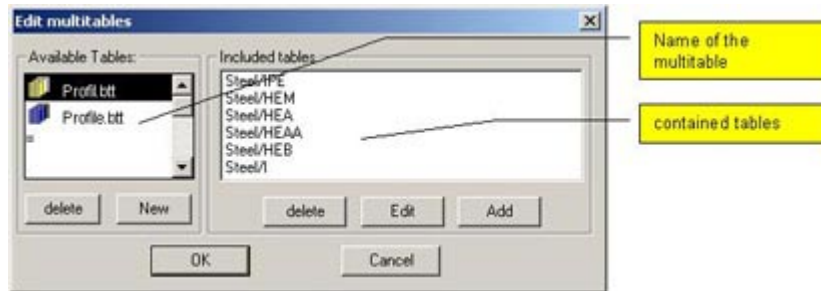
2.8 Entering and changing the database

2.8.1 Purpose

In the database management, the individual database tables are organised in groups. Existing databases can be edited and newly created. The table manager is started via Extras - Manage Database and can be left open in parallel to VCmaster.

How to query information from the database was already described in Chapter 2.7. Please refer to this chapter.
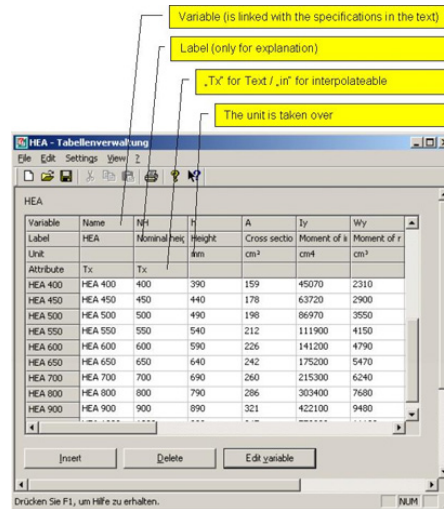
Extras-Manage database

Important:
For a better overview, a label can be specified but this has no effect on the search.

The input area is compatible with standard table programs via the clipboard.

2.8.2 Structure of the database

The database table variables of the columns and three parameters each**.** The value being searched for with the specifications in the text is linked via the variable name. For a better overview, a label can be specified but this has no effect on the search. If a unit of measurement is specifiedconsists of input columns and a table header. The table header contains the, this is returned with the associated value of the variable.

Important: Define a variable as text with "Tx" or as interpolable with "in" in the *Attribute* field.

Note: Greek characters are written out in full in the table header. The query can search for "σ_W" in VCmaster. The program will find the associated entry "sigmaW" in the table. A diameter symbol is specified in the table as "Æ" (ALT+0198). VCmaster converts this automatically into a "ø" when it is inserted.

Important functions:

- **Insert:** Mark the line or column (click in the grey area). A new line or column is inserted before the mark.

- **Delete:** Mark the line or column to be deleted and then delete it.

- **Edit variables:** Switch over from data input to input in the table header.

- **Table settings – Tile rows:**
  Changes the display depending on the structure of the data. Changing the display can also be useful to display all variables and save space on the screen (see below).
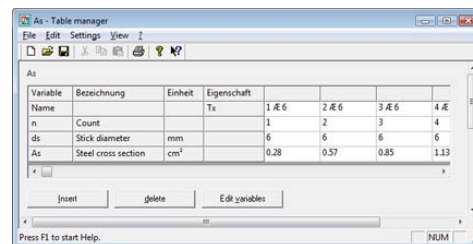
File structure

- **File open:** For a better overview, the databases are arranged in groups. Select a table group and open the database by double-clicking on the table name or via Open.

- **Save:** Enter the group and the name of the table in the dialog.

- All tables are saved in the folder "_tables" in the template folder. The directory structure is constructed as follows: ".._tables\<group>\<name>".
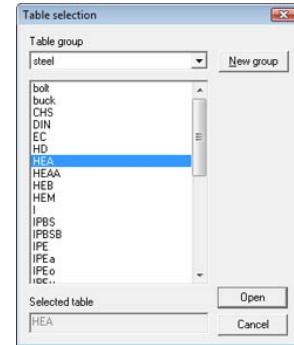
2.8.3 Interpolation of values

The equals sign "=" is required in the specified condition. If ">" or "<" is specified, the database table provides the next value without interpolation.

Example: If "kd = 3.22" is specified as the condition and "C25/30" as concrete, VCmaster determines the return value for ks1 as 2.39.

Important note on **data transfer from other programs:**
The input area is compatible to standard spreadsheets via the clipboard. Since each data collection can usually be exported in such a format, databases can be created for VCmaster without manual input of the data if digital templates exist. Only the variables and attributes need to be specified.

2.9 Important tools and settings

2.9.1 Checking structural analyses

Any modification within a calculation can have far-reaching consequences on structural analyses and the selection of components. These consequences are not always immediately apparent. The *Control analysis* function solves this problem. It checks the entire document and looks for errors in structural analyses that are not fulfilled or the results of SEL() function that need to be checked.

**Calculate-
Control analysis**

Principle:
If an analysis that is not fulfilled is found, the check stops at the relevant position and the line is marked.

Everything behind the cursor position is checked. If an analysis that is not fulfilled is found, the check stops at the relevant position and the line is marked. The cause can be remedied without closing the dialog shown on the right. By clicking on the *next point*, the note is ignored.
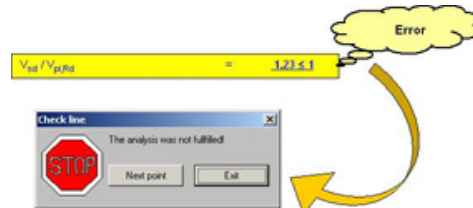
The details of the SEL() functions are checked to see if they are affected by a change. In this case the line is marked in red. The checking function stops at this position and the user can call up the SEL() function (double-click on the result) in order to select a component, for example.

If the end of the document is reached, a message appears. If necessary, the check can continue at the start of the document.
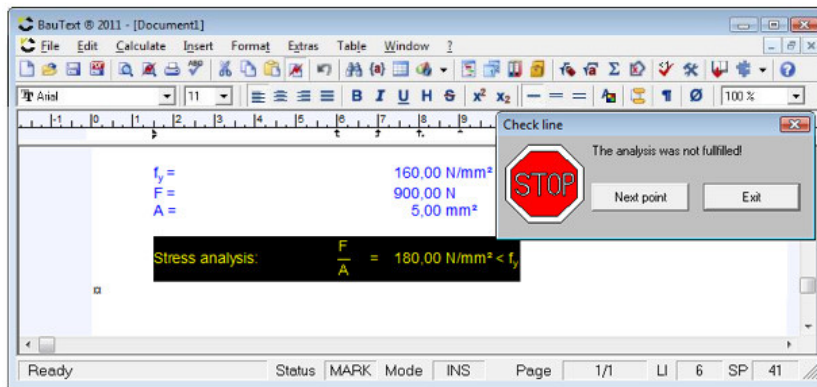
Second Example

Note: The permanent checking of structural analyses takes time and affects the workflow. During changes to several inputs that belong together it is frequently the case that a structural analysis is not allowed, but only for a temporary period. VCmaster cannot deal with this situation because the program does not know what the user will do next. For this reason, the function is not automatically called up by the calculating component.

2.9.2 Editing units of measurement

In VCmaster the desired unit of measurement can be clicked. A list of units is displayed in the dialog. See Chapter 2.4. This list with preallocated units of measurement can be extended or edited.

In addition, VCmaster enables the switchover between different lists. This is a good idea if calculations are compiled for countries whose customary units of measurement deviate from one another (e.g. inch and cm). The switching of the customary units of measurement can also be useful for engineers who work in different areas (e.g. building and construction industry and machine and plant construction).
The editing is carried out in the WindowsTM Editor. The program interprets each ASCII text file in the VCmaster directory with the extension "*.btm" as a list with units of measurement. As a result, the displayed groups can be extended as required.

2.9.3 Calculation line formats

The standard calculation line formats are entered in the dialog shown on the right.
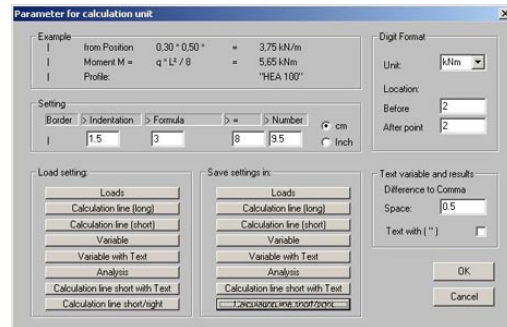
These presettings are used for the formatting and alignment of calculation lines.

2.9.4 Hiding functions in the printout

Often the display of the syntax of the TAB() and SEL() function or of the IF() function is not desired on the printout (see also Chapter 2.3 or Chapter 2.7). These can be hidden. The same thing applies to the expressions of the calculation tables (for more details, see Chapter 2.6). In this case, the hiding concerns the line and the column in which the mark for the calculation table is located.

The print option "Print in black" is required in order to obtain a black printout from colour printers or from printers that print output in greyscales. Note: In many devices this option can be activated in the driver.

For notes on the background images, see Chapter 4.1.

3. Compiling technical documents

Structural analyses and other technical documents consist of a wide range of components. For example, these include:

- introductory and explanatory texts,

- design drawings and graphics,

- calculations with specialist software, structural analysis software or with manufacturer's programs,

- loads based on DIN, manufacturer specifications and regulatory statutes,

- as well as handwritten detailed analyses, design measurements and calculations.

General text and spreadsheet calculation programs only fulfill these tasks to a limited extent. In contrast, VCmaster was specially developed for consistent computer-supported generation of structural analyses and other technical documentation. Our software provides the user with a generic product approach. The great advantage of VCmaster is that calculations can be seamlessly executed in the text program. It is this that distinguishes VCmaster substantially from other text and calculation programs. Through the integration of specialist and structural analysis software our concept goes even further. VCmaster solves three tasks: Calculation, writing and compilation. This is unique.

VCmaster integrates the software from a wide range of providers, thus distinguishing it from existing stand-alone solutions. Interfaces such as t2W and OLE allow the transfer of data from other programs. The outputs of structural analyses and CAD programs, technical information, standards and manufacturer specifications can be seamlessly transferred and used.

Text modules and variant calculations are stored as templates which are then used to automate and accelerate recurrent calculations, structural analyses and explanations. Just a mouse-click on a standard value is all that VCmaster needs to recalculate all dependent values. As well as saving time, sources of error are reduced. This frees the engineer from routine tasks so he is much more able to concentrate on the essentials.

The reuse of calculations and documents is effectively supported. VCmaster simplifies the making of modifications and adaptations, and automates routine tasks. Collaboration with other engineering offices and clients as well as within working groups becomes easier. The export function to PDF format supports archiving and, hence, document management within companies. The time for editing and hence the costs for compiling structural analyses and technical documentation are reduced by 30% and more.

3.1 Template tools

3.1.1 Overview

All documents and calculations created with
VCmaster can also be searched, called up and
reused in the future. The software supports the
setup and administration of individual libraries with
calculation templates. Text modules and calculations
carried out are stored there as templates.
Intelligent search functions for recurrent
calculations, structural analyses and explanations ensure that solutions developed for
tasks previously performed can quickly be located.

This assures the continuous transfer and multiple use of important know-how. New
documents are compiled according to the modular principle on the basis of templates. This
saves a vast amount of time.

VCmaster contains hundreds of ready-made macros. The calculation templates provide
solutions for separate structural analyses and details in the fields of steel, wood, solid,
composite and masonry construction, as well as mechanical engineering and plant
construction. All templates can be extended, combined and adapted to individual
requirements as necessary. Stored databases contain thousands of parameters for
components, profiles, coefficients and materials. The determination of such calculation
parameters is fully automated.

Overviews of the libraries can be viewed in PDF format. All PDF catalogues can be found
on the Internet at www.VCmaster.com (see also *? - Available template*s).

In Chapter 3.1 we explain the tools that make it possible to:

- work with ready-made templates,
- to insert texts and calculations from reference projects,
- to copy texts and calculations within the project and
- to use macros and phrase templates for recurrent texts and comments.

All text processing functions correspond to the Windows standard. Instructions on the
design of documents can be found in Chapter 4.

Documents are compiled using the modular design principle.

VCmaster contains hundreds of ready-made macros.

Note:
No special tools are required to write and insert text as there is a text editing program at the core of VCmaster.

We refrain from explaining basic Windows functions. We assume a basic knowledge of Windows text processing, of tabs and the marking and formatting of texts, using the clipboard, etc.

3.1.2 Inserting templates with the Template Explorer

VCmaster manages templates for frequently recurring tasks. The time gained by the consistent use of such templates is enormous as the documents can be compiled based on the modular principle.

Self-created templates can be completed via *File-Template manager*.
Texts and calculations can be inserted in the document with the Template Explorer. A more detailed description can be found below.

Important: All files in the templates library begin with "_". If necessary, use a different name for your own or modified templates. In this way you can differentiate these from your own templates and also you can be sure that changes are not overwritten during a reinstallation.
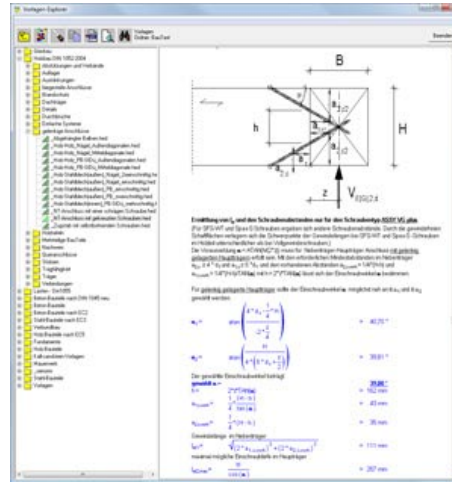
F10

**Insert-
Template Explorer**

Principle:
With the Template Explorer, templates are inserted from the library into the documents.

3.1.3 Inserting from a reference project

VCmaster supports taking one or more reference projects as a template for the current project.

Whether from lack of time or even intentionally, not every structural analysis is copied to the template library. The *Insert - From reference project* function enables you to transfer file fragments from another project.

This option saves an enormous amount of time in practice because many solutions can be reused. Many details are similar or identical even if the projects differ in scope or geometry.
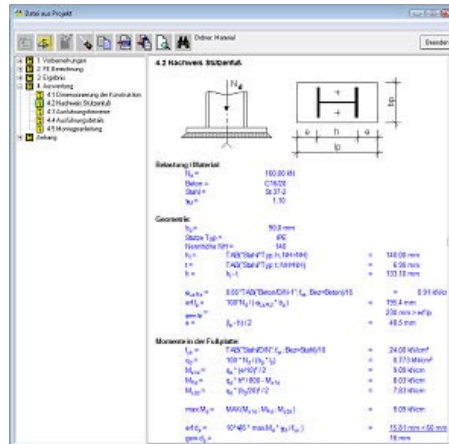
**Insert-
From reference project**

Principle:
Supports taking one or more reference projects as a template for the current project.

The document structure is displayed on the left. Prerequisite is that information has been entered in the table of contents (see Chapter 4.2).

Switching between Document and Index Structure:

Directory structure

Document structure
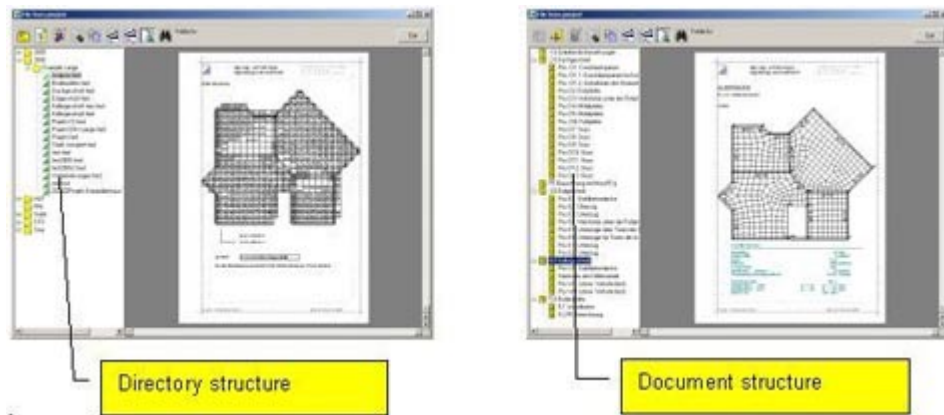
3.1.4 Copying within the project

Extras-
Back view window
on/off

Principle:
Displaying the current
document in a second
window enables the
user to make transfers
from preceding text
passages without
having to scroll through
the document.

Advantage:
VCmaster can search for
solutions in existing
documents. This
simplifies re-use of
calculations.

VCmaster allows the current document to be displayed in a second window. This allows texts, structural analyses, complete positions or loads to be transferred from preceding text passages without having to scroll through the document. This is very useful if similar structural analyses are used several times.

The update takes place automatically at a time interval specified by the user and/or by activating the window. The setting depends on the current task and use. The user is responsible for selecting the setting here so that the requisite data are updated as often as required.

3.1.5 Important functions of the above-mentioned tools

The modules From reference *project* and *Back view window* can be searched for solutions to a task in existing documents.

Search word

Selection of the path

Information area

This feature allows the engineer and/or workgroup to use such calculations over and over. This VCmaster capability is a basic prerequisite for a functioning knowledge management system in the engineering office. Errors and the customary frictional losses in the office routine are also prevented or reduced.

Comment

Options

Refresh file structure

Up one level

36
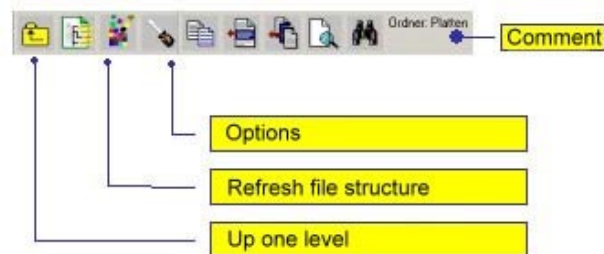
Displays and Buttons

Inserting a marked area

Individual chapters can be transferred from a reference project. In the *Back view window* it is possible to copy items within the project by clicking on the heading. Procedure: Click on the chapter heading and transfer the contents by clicking on the left button.

The Template Explorer also manages the template files. To do this, please press the right mouse key and the corresponding context menu will appear (figure on the right).

Copy	Strg+C
Cut	Strg+X
insert	Ctrl+V
Delete	Del
Rename file	F2
New Main Directory	
New Subdirectory	

3.1.6 Macros and phrase templates
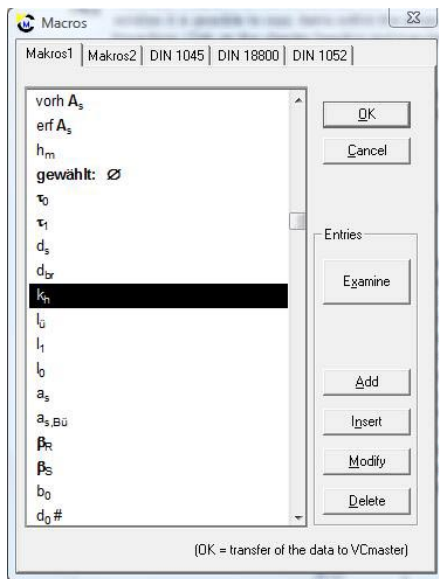
Frequently-used formulations and formula symbols are stored and called up under *Insert - Macros*.

Macros normally contain formula symbols. Phrase templates are intended for longer formulations. A collection of formulas can even be created in this way. Autotext contains 100 terms that can be inserted via the menu or the toolbox. The formulations "from...", etc. can also be called up here.
We already supply numerous macros and Autotext entries with VCmaster. VCmaster also includes simple address administration for written correspondence. The addresses can be assigned to different groups. Telephone and fax numbers as well as comments can also be specified. When inserting the address these details are not transferred.

Example: Inserting Autotext via the toolbox

Example Context menu
(right mouse key)
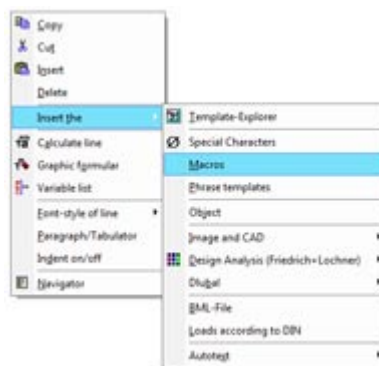
3.2 Integration of specialist and structural analysis programs

3.2.1 Introduction

VCmaster is not a stand-alone solution. Other programs are consistently integrated in the design concept. Intelligent interfaces enable the output of all structural analysis and CAD programs to be adopted. The benefits for creating, changing, reusing and administrating are enormous. This functionality means that savings are achieved in practice whose benefits are comparable with the introduction of CAD software.

VCmaster makes it possible to create a complete technical documentation in a continuous file. This brings together information from a variety of sources. All texts are written directly with VCmaster, the calculating functions of the program save having to use the calculator. All other data, such as structural positions or drawings, are created as usual and taken over by VCmaster.

This is only possible through intelligent and extremely efficient interfaces:

- **Integrating a program:** All programs can be directly integrated in the VCmaster menu and can be called up from there.

- **BML interface:** We have included an XML-based interface in VCmaster. Most of the German software producers in structural engineering are already using this interface and others have shown interest. BML is becoming ever more prevalent as the default format for transfer to VCmaster.

- **Special interfaces:** The German structural analysis programs from Friedrich+Lochner and Dlubal as well as the German CAD software from Nemetschek and Glaser -isb cad- are directly integrated in VCmaster.

- **t2W-Technology:** is installed as a printer driver. Similar to PDF, t2W directs the print output of all Windows programs to VCmaster. This completely novel solution can be used to transfer the output of each program quickly and easily.

- **OLE technology:** Objects that have been created with other programs can be integrated using OLE technology. The precondition is that the program to be integrated is also OLE-compatible.

- **Clipboard:** This is a Windows standard and is mentioned for completeness.

3.2.2 Integrating applications in the menu

Frequently used programs can be integrated directly in the VCmaster menu and can be called up from there. A special interface was defined for this purpose. The procedure is comparable with plug-in or add-on technologies in other software products (e.g. in the browser). In the interface, the name, location and call-up options of the application are described and assigned to the VCmaster menu.
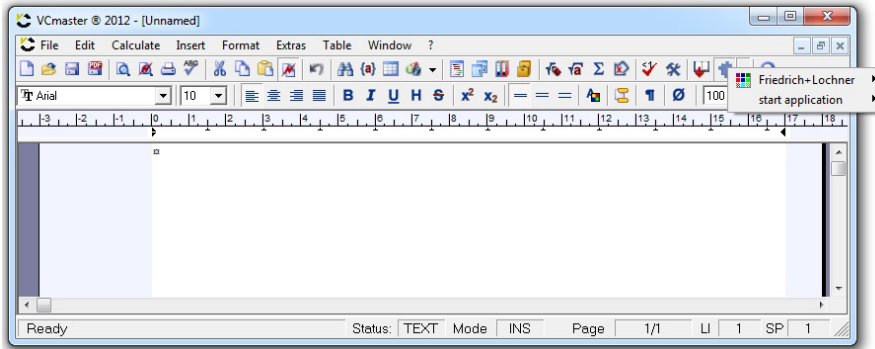
Each entry in the VCmaster menu requires a configuration file with the extension ".men". When VCmaster is started, all *.men files that are in the path for local settings are read in and their contents entered when the application is activated. See also *Extras - Settings - Installation directories*. When the entry is made, a check is made that the program is installed at the specified location. If not, no menu item appears.

For the known standard solutions in the building and construction industry, we – or the manufacturer – supply the relevant configuration files, so the user saves time and effort. You can supplement the configuration files or newly create your own.

The following functions are provided for this purpose:

Managing the configuration

This dialog can be used to set up, adopt or show and hide a new configuration. Deactivated applications can be activated again at any time.

Program path or registration entry

The installation path of the applications can be specified under the program path or registration entry if it applies for all programs of the entry. This can be the following:

- Direct path specification with drive letters and directories,
- an entry in the registration, e.g. in the form *HKEY_LOCAL_MACHINE, Software\Company\Paths, entry for the program path* (separate data by commas)
- the ReadRegPath command, if the path for each program is to be specified separately in the program name with a registration key.

An icon can be specified for the display in the menu. The path can also be controlled via the main path.

Program parameters

The individual applications of the configuration file are added here. The following is specified:

- Designation in the VCmaster menu
- Comment in the status line of VCmaster
- The program name. If the program path was specified, the word "Path" must be prefixed to the path (e.g. *Path,program.exe*). If "ReadRegPath" was specified under program path, this must be prefixed by the registry key, e.g. in the form *HKEY_LOCAL_MACHINE,Software\Company\Paths,entry for installation path* (all data are separated by commas).

Structuring of the menu-item

Here the menu item can be designed or structured. This is possible using dividing lines or subgroups.

Insert-Settings-Integrate applications

3.2.3 Transfer of data

The integration of programs is sensible in particular because VCmaster can adopt the data of all Windows programs. The interfaces available for this are briefly described at this point. A detailed description can be found in the further chapters.

Via the t2W interface

The transfer is carried out in 4 steps:

1) Click on Print Output in the calculation program
2) Select t2W interface
3) Set page / Specify extract (red)
4) Transfer output to VCmaster

For the first time the unique t2W-Technology (transpose to worksheet) allows the transfer of the outputs of all Windows programs.

Via the VCmaster BML standard interface

We have included a BML interface which means the output of each program to VCmaster can be quickly and easily realised with this solution. If you need to transfer the output of one of your programs, please contact the software manufacturer if necessary. Realisation is normally easy and convenient since we provide appropriate tools at no charge.

Prerequisites are:

1) The calculation program must offer the possibility of creating and sending BML files (for more details, see the documentation of the respective program).
2) If the program sends the file, the document must be open in VCmaster. The insert takes place at the cursor position.
3) Otherwise stored BML files are read via *File – Import – BML*.

The interface is based on XML-like ASCII format. This can be generated by any manufacturer. We are glad to support the manufacturer with the development and are open to enhancements at all times. The sometimes very pressing requests of our customers confirm that we are on a very innovative and promising path with this approach.

Note:
Further information on the interface is given in Chapter 3.4 ff.

Special interfaces

The leading German structural analysis programs from Friedrich+Lochner and Dlubal are seamlessly integrated via interfaces.

3.3 Graphics and CAD

3.3.1 Available interfaces

**Insert-
Image and CAD**

From file
From image library
System sketch
Allplan LT
Allplan
Glaser -isb cad-

Outlines, drawings and execution details are important elements of technical documents.

VCmaster offers more possibilities for the transfer and editing of graphics and the integration of CAD programs:

- **Special interfaces** to Glaser - isb cad - and Nemetschek**.**
- **Import interfaces** in various standard Windows formats
- **t2W-Technology**: t2W is installed as a printer driver. Similar to PDF, t2W directs the print output to VCmaster. With CAD programs, it has the advantage **that transfer takes place in print mode**. Unlike via the clipboard, line weights and colours are set. See also Chapter 3.4.
- **OLE technology**: CAD programs are integrated via OLE technology. This technology offers the option of integrating CAD in VCmaster **without buffering**. For editing, a double-click is enough and the CAD program will be started. See also Chapter 3.5.
- **Clipboard**: This is a Windows standard and is mentioned for completeness.
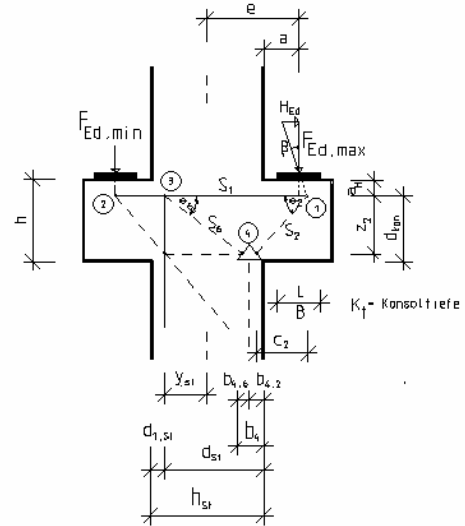
3.3.2 Integrating Nemetschek

1) Select *Nemetschek Allplan* in the VCmaster menu under *Insert - Image and CAD*.
2) Mark the drawing or the part of the drawing to be transferred. Select *Edit - Copy* or *CTRL+C.* Then close the CAD program.
3) The graphic is inserted after closing the program and the size and position adjusted if necessary.
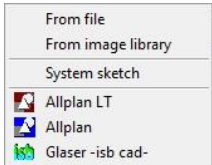
3.3.3 Integrating Glaser -isb cad-

1) Select *Glaser -isb cad-* in the VCmaster menu under *Insert - Image and CAD*.

2) Mark the drawing or the part of the drawing to be transferred under *File - Graphic*. The line weights can be specified under *Settings*.
Select the VCmaster option (see figure on the right).

3) The graphic is inserted after the program is closed and the size and position adjusted if necessary.
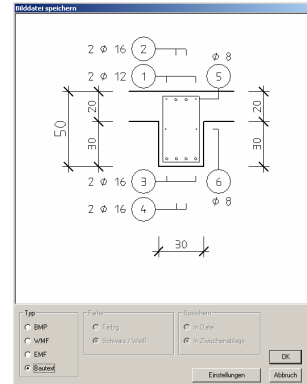
3.3.4 Importing standard formats

There are nine standard formats available:

- Windows Metafile (*.wmf)
- Enhanced Metafile (*.emf)
- Windows Bitmap (*.bmp)
- JPEG-Format (*.jpg)
- PC Paintbrush (*.pcx)
- Graphics Interchange (*.gif)
- Tag Image File Format (*.tif)
- Portable Network Graphics (*.png)
- TARGA (*.tga)
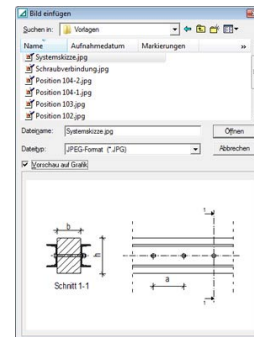
The page preview allows viewing prior to inserting. Please pay attention to the setting of the required format. If you want to insert a Bitmap, for instance, select "Windows Bitmap" as the file type.

3.3.5 Important note on other CAD formats

CAD data are imported via your CAD program and the interfaces mentioned above or via the clipboard. VCmaster does not have its own import filter for the following formats: DXF, HPGL, PRN, PLT, DGN, DWG, etc. It is possible to transfer such files using the t2W-Technology. To do this, call up the CAD program or an appropriate viewer. Go to Print in this program and select the t2W interface. The OLE technology is available as an alternative.

3.4 t2W interface

3.4.1 The principle

T2W is installed as printer driver. Similarly to PDF, t2W passes the print version of all programs to the statics editor.

For the first time the unique t2W-Technology (transpose to worksheet) allows the transfer of the outputs of all Windows programs. This means our concept of digitally creating complete structural analyses and other technical documentation is completed in an almost revolutionary way. The result is a consistent document, complete with page numbering, list of contents, PDF export and much more.

The concept of the t2W-Technology goes significantly further. It provides the engineer with a new tool that offers numerous possibilities in technical documentation. With t2W the outputs of a wide range of different programs can be combined in a standardised layout in a single document. What's new here is that comments and calculations can be added in the most simple way to outputs (e.g. from structural analysis and CAD software) in a word processing program. The application possibilities are numerous.

The application possibilities of t2W include the transfer of outputs from the specialist software or of graphics.

The transfer is carried out in 4 steps:

1) **Click on Print Output in the calculation program**
2) **Select t2W interface**
3) **Set page / Specify extract (red)**
4) **Transfer output to VCmaster**

3.4.2 Notes on the technical background

t2W is an extremely complex technology. For this reason it requires up-to-date systems such as Windows XP, Vista or Windows7. The functionality also depends on numerous components that are beyond our control. These include, for example:

- Printer and screen drivers
- Installed fonts
- Specific properties of the sending program

In the majority of cases t2W functions without any problem. We provide information on technology-related restrictions in the following. This know-how makes it easier to deal with the interface.

Presentation as picture or vector graphic

t2W accepts the presentation of the program as vector graphic or as JPEG image. Both presentations have advantages and disadvantages.

Vector graphics:

- 2D graphics generally require less memory / 3D images considerably more.
- The quality of the presentation is very good.
- If the sending program prints bitmaps then vector graphic makes little sense.
- Not all fonts can be accepted (see below).

JPEG graphics:

- 3D graphics are converted into a format that demands less memory. This applies also for small sections from large graphics.
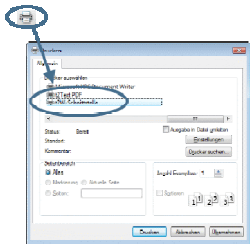- The quality of the presentation is completely acceptable. The display of the images on the screen is slightly worse than for vector graphics. For printing, the difference is generally irrelevant.
- The VCmaster data generated are usually smaller.

Unfortunately, it is not possible to make a general declaration. The memory requirements and the quality of the presentation and thereby the recommended technology depend on the sending program. We attempt to make a reasonable input requirement internally. If in doubt, trial and error is unfortunately the best way to proceed.

Important instructions regarding fonts (especially with PDF)

t2W can, in principle, accept the output of all programs. VCmaster must also be able to display the transferred data. For this purpose, Windows fonts are necessary. This is no problem, as long as installed fonts, such as Arial, Times Roman or Courier are used. As Windows programs generally use installed fonts, this functions smoothly. It is only critical if data is swapped between different PC systems and these texts contain **unusual fonts**. Such data can only be accepted as images. VCmaster recognises this and sets this option automatically

t2W accepts the presentation of the program as vector graphic or as JPEG image.

3.4.3 Controlling the transfer

The window for controlling the transfer (see below) is called up automatically if the output of a program is made via t2W. VCmaster should be already open at this point. The following details are required:

Cut or edit section

Import of single or several pages

Selected configuration

Import as picture or vector graphic

Positioning can be centred

Additional difference for space reserves

Zoom factor for transfer

Pages for transfer

Print area
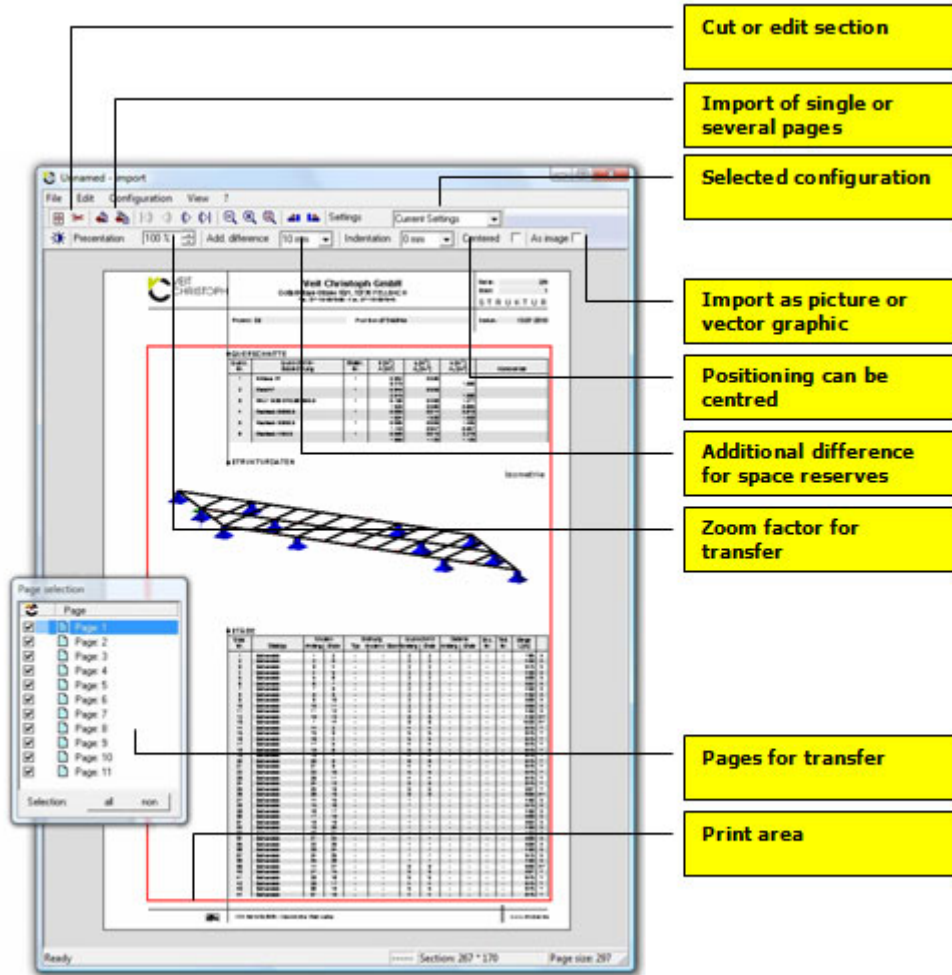
- **Selected configuration:** As the output format of every software manufacturer differs from one another, the area to be transferred by VCmaster must be specified on a program-specific basis. To avoid the user having to give these details each time the program is called up, a setting can be saved under the program name or the manufacturer and is taken as the basditionalis at each new call-up**.**

- **Transfer as a hybrid object (optional):** The transferred data are linked with the VCmaster document. This reduces the load on the computer resources. The data are automatically reloaded when required. See Chapter 3.4.4. Note: The technology requires that the file name and storage location of the VCmaster document are known. You will be prompted to save any unnamed documents.

- **Presentation as picture or vector graphic:** You can find more about technical background below. Please set the quality of the JPEG images using the button shown.

- **Additional margin, indentation, centred:** It is not advisable to use the print area in VCmaster down to the last millimetre. Using an additional margin, you can set the clearance which can later be used, e.g. for titles. The positioning can be centred or with an indent**.**

- **Zoom factor for transfer:** The output can be zoomed in or out in percent. This is required, for example, if the print area of the program is larger than in VCmaster. The plot must then be zoomed accordingly. The settings can also be adapted so that graphics, for example, are scaled when transferred. This, of course, only applies if these also fit into the space available in VCmaster. If necessary, the print area must be reduced accordingly in the program that is sending**.**

- **Zoom to the view: Zooms** the view in or out.

- **Rotate the image:** Rotates the view.

- **Scroll:** Scroll between the pages of the presentation / to the first or last page**.**

- **Transfer:** Transfers one or more pages to VCmaster. The TechEditor must be open for this. The output is inserted at the cursor position. Note: The insertion location can still be modified in VCmaster prior to transfer.

- **Cut or edit section:** Areas of individual pages that are not to be transferred can be eliminated by cutting. Note: This also applies to blank areas because these, due to the technology, are included in the plot area. Such areas can no longer be written later in VCmaster. This is why the elimination of blank areas makes sense. The areas of the print plot to be converted to text can be specified at the same time. Please refer to the next pages for further information**.**

- **Print area:** The output area to be transferred. Note: Please do not only check the first page. It is quite possible that a larger area is required on subsequent pages**.**

- **Pages for transfer:** Control of the display and the transfer. Note: The page is not transferred if the tick is removed.

3.4.4 Instructions for use and the settings

For technological reasons t2W takes over the print plot of the sending program. In most cases it is sufficient to take this over after defining the transfer area. The user can also influence the transfer in two ways:

- Plot cutting to delete parts later in VCmaster and/or
- Marking text areas to make the text inside it available for editing.

Defining print area / Cutting plot

Please select the left of the two buttons shown to define the print area to be transferred. To do this, the red frame is drawn with the mouse so that two conditions are met:

- The selected plot area must match the print area available in VCmaster.
  Note: Use percentage zoom if necessary.
- Headers and footers of the sending program should be completely eliminated.

Please use the button with the scissors symbol to cut pages. The plot can thus also be sectioned into different areas. Cuts are marked by a pink-coloured line. These can be shifted with the left mouse key and deleted with the right mouse key. The effort must be balanced against the benefit. Areas that are not needed or large blank spaces should generally be separated by cutting. These can be deleted after they have been transferred to VCmaster.

Defining text areas

The texts in a plot range (even a whole page) can be made available as editable text. To do so, press the right mouse key in a plot area. A text area is marked in yellow. The selection can be undone by Delete text range.

Conversion to text has two advantages. Firstly, the text can be edited and, secondly, the transfer as text saves memory. Unfortunately, the quality of the transformation depends on the type of print output of the sending program and is therefore not always possible. The selected areas should not contain other elements such as graphics as these cannot be converted. Again the effort and benefit should be considered. In any case it is quicker to place explanations before or after the unchanged plot. However, the lower memory requirement and the possibility to edit the text speak in favour of the conversion.
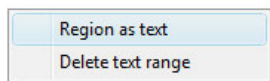
Manufacturer- or program-specific

As the output formats of every software manufacturer differ from one another, the area to be transferred must be specified on a manufacturer-specific or program-specific basis. To avoid the user having to give these details each time the program is called up, a setting under the program name or the manufacturer can be used at each new call-up.
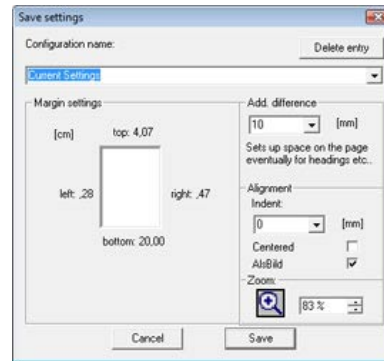
Settings

The t2W interface can be configured on a user-specific basis:

- **Transfer:** If the plot is larger than the print area available in VCmaster, t2W will reject the transfer. This block can be deactivated.

- **Closing a mask:** Saves closing the mask. May be a disadvantage if the user makes a mistake when transferring to VCmaster. The data transfer must then be completely restarted**.**

- **Page breaks:** Sets fixed page breaks between the pages for transfer.

- **Blank lines:** Inserts blank lines prior to transfer (e.g. for a heading). Please note that there must be sufficient space for blank lines. Please do not fully utilise the plot area and it is better to work with an additional difference for reserve if necessary.

- **Split plot:** The plot should not necessarily be higher than the maximum height that can be displayed in VCmaster. If the monitor is large, splitting is not necessary. With smaller monitors, it makes sense as otherwise the entire plot cannot be displayed when scrolling.
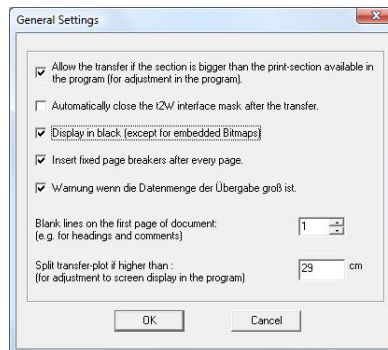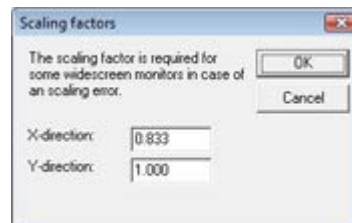
Scaling in case of distortions

For some wide screens, a scaling factor must be specified if the display of the transfer is distorted.

This is usually calculated from: $\dfrac{P_y * 4}{P_x * 3}$

P_x = horizontal screen pixels
P_y = vertical screen pixels

3.4.5 t2W-Hybrid-Technologie (optional)

Purpose and Advantages

t2W-Hybrid-Technology combines the advantages of interactive word processing software with the benefits familiar from PDF technology. PDF files are - in simple terms - a collection of expressions that can be displayed and saved very efficiently.

With t2W-Hybrid, we offer an option which for the first time allows objects to be embedded in word processing software with comparable advantages. In engineering practice, the expressions are from CAD or specialist programs. Our unique technology saves computer resources, even with the insertion of hundreds of pages. Documents with thousands of pages can be seamlessly compiled and edited.

This further development of t2W-Technology will satisfy the ever increasing demands on digital technical documentation. The new Hybrid-Technology is a quantum leap forward and its performance puts all other documentation tools in the shade.

We are especially proud that this extremely complex technology works fully automatically in the background. The user does not notice anything – except that huge documents are loaded, edited and saved in a fraction of the time.

Subsequent conversion

Extras-
Convert in t2W hybrid

Graphics imported into existing projects can be subsequently converted into Hybrid objects and, thus, transferred out. Please use the function:

Note: You can mark the desired area. If no marking is set, all graphics in the document are converted.

File organisation and export

File-
Export-Save ZIP file

The t2W-Hybrid objects are stored in a sub-folder that has the same name as the VCmaster document. This is important, especially when transferring data. The following function is provided to simplify this:

Please use this function for transferring files with hybrid objects, in order to ensure complete datasets.
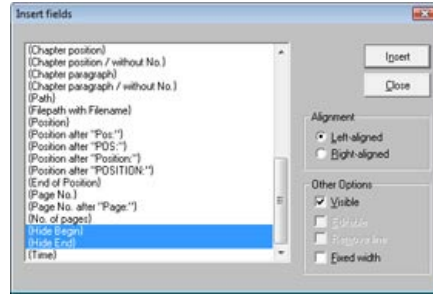
3.5 OLE interface

Principle

Objects that have been created with other programs can be integrated using OLE technology. Such an object can be a graphic, for example, a table or the results text from a calculation.

Prerequisite is that the program used to create an object is OLE compatible. This is normally the case with standard and CAD software. Calculation programs, however, contain this technology less often. You can create a new embedded object or open an existing file.

Example

Tables that have been created with other programs can be integrated using OLE technology. The precondition is that the program is OLE-compatible. This is normally the case with standard software.
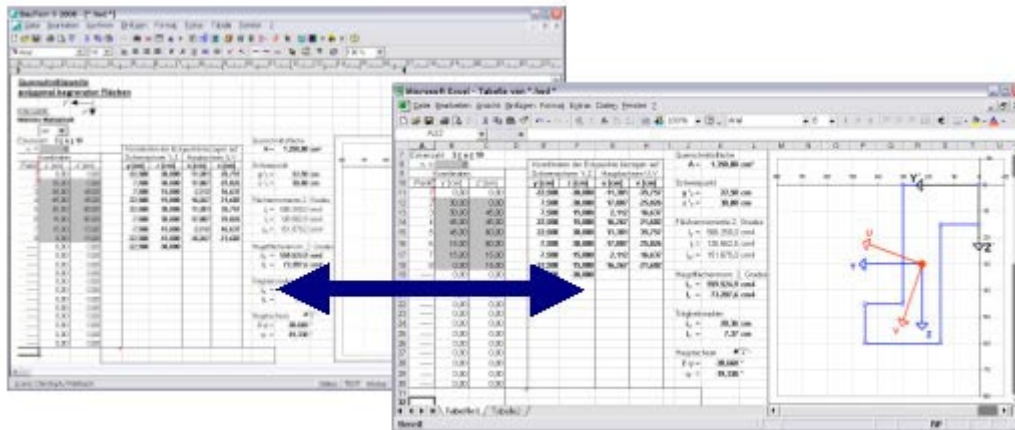
Example: Display of an EXCEL* calculation (right) in VCmaster (left):

* EXCEL is a registered trademark of Microsoft Inc

Editing design drawings and details in an OLE-capable CAD program, for example, would be carried out in the same way.

Using OLE technology

Difference between linking and embedding: In a linked object, the data are only refreshed if the source file is changed. Linked data are stored in the source file. Only the save location of the source file is saved and a representation of the linked data displayed in the VCmaster file. Use linked objects if the file size needs to be taken into consideration.

For an embedded object, the data are stored in VCmaster. This means they are no longer a component of the source file once they have been inserted.

Embedding an existing file

1) Click on the position in the document where you want to insert the object.

2) In the Insert menu, click on Object and then on the *Create from file.*

3) Enter the name of the file in the File Name field from which you want to create a linked or embedded object or click on Search to select from a list.

4) To create a linked object (see above), activate the Link checkbox. An embedded object will be created if you do not activate the Link checkbox.

Important note: The operating system determines the application which will be used for editing the file later. The application that is used is controlled by the file extension. VCmaster has no influence on this.

Creating and embedding a new file

1) Click on the position in the document where you want to insert the embedded object.

2) In the Insert menu, click on Object and then on the Create New tab.

3) In the Object Type field, click on the object type you want to create.

Note:
OLE objects that are longer than one page are truncated. For technical reasons, a page break within an object is not possible.

Important note: The Open function is usually deactivated in the application. This is logical since an embedded file is to be created. This is physically stored in VCmaster. If this file contains data already stored on the hard disk, please use the Insert function in the application.

Important instructions

OLE is an extremely complex technology. For this reason all programs must work together properly. We wish to point out that external errors can affect the stability of the system and our program. Please understand that we cannot guarantee liability or support in this case. OLE objects that are larger than one page will be truncated accordingly. A page break within an object is not possible for technological reasons.
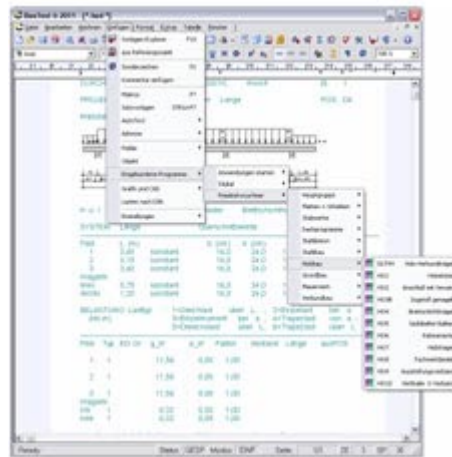
3.6 Interfaces to Friedrich+Lochner and Dlubal

3.6.1 Friedrich+ Lochner

This interface enables the transfer of the complete output of Friedrich+Lochner programs.

Explanations, specifications of measurements or additional calculations can be supplemented or inserted in the Friedrich+Lochner output.

The Friedrich and Lochner programs are automatically integrated in the VCmaster menu (see figure on the right). Graphics are transferred to scale and printed out. Tables and table headers are taken into account. All Windows fonts are possible.

Insert-Integrate applications

Principle:
This interface enables the transfer of the complete output of Friedrich+Lochner programs.

Procedure

1) Select the program from the VCmaster menu and start it.
2) Specify the output profile in the Friedrich+Lochner program and calculate the position.
3) End the program.
4) VCmaster automatically inserts the output.
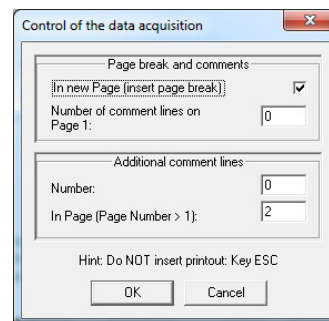
Working in parallel with both programs

The interface enables working in parallel between both programs. Thus, numeric values can be copied from VCmaster to Friedrich+Lochner via the clipboard. This is of particular interest for passing on loads if information from previous items is required.

Changing and deleting items

Fast exchange of the affected pages is required especially in the case of changes. VCmaster updates the relevant pages with a single click of the mouse.
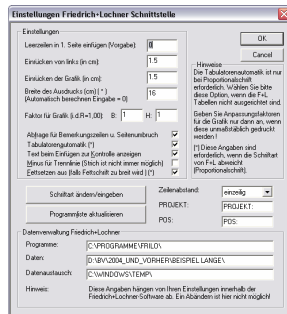
1) Click on the item and press the right mouse key.

2) The corresponding context menu appears (see right).

Configuring the interface

Select the font: The output from Friedrich+Lochner is only made in fonts with a constant (non proportional) character width. VCmaster uses all types of fonts. The program must recalculate the display if the font type in VCmaster differs from that in Friedrich+Lochner. In this case, activate "Tabulator automatic". The program requires this for recalculating the print width. Enter this or let the program determine it by specifying "0.0" (recommended).

Indenting: Text and graphics can be indented differently. Please observe the sheet width and height (minus margins) for graphics. Neither of these must be less than those of Friedrich+Lochner. Please match the settings of both programs so that the print area is approximately the same.

Inserting comment lines: Activate the query window for comment lines and page break (see above)

Other options: "Show text (for checking) when inserting" scrolls through the inserted pages on the screen which means that a quick check is possible. "Minus for separation" must be activated if the dividing line is incorrectly displayed. "Extend program list" allows the F+L programs to be added.
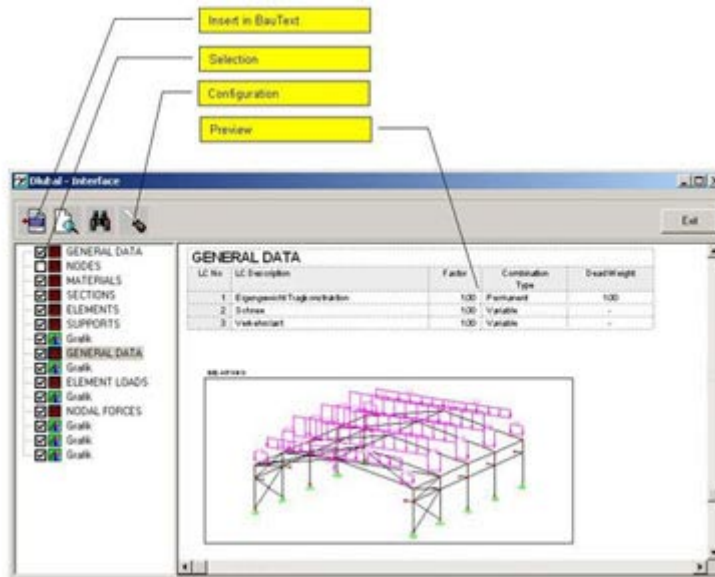
3.6.2 Dlubal

The interface enables complete or partial transfer of the Dlubal programs output.

1) Select the program from the VCmaster menu and start it. Selection from the VCmaster interface is not mandatory.

2) Start the data transfer to VCmaster in the Dlubal program.

3) Once VCmaster has started the desired data are automatically transferred. VCmaster opens the following transfer dialog.

The outputs from RSTAB can be very extensive. Use an empty VCmaster file if necessary and only join the entire document together at the end using Batch. The tabular output of the Dlubal programs slows down the speed of VCmaster. We offer an option, therefore, to convert the tables into formatted text lines. This is recommended for large documents.

The table headers are taken into account in page breaks.

You will find a few control options for setting in the window shown above.

Alternative t2W

The transfer may be more efficient via t2W. The intelligent Dlubal interface has the advantage that the texts can be edited.

3.7 Creating simple sketches

3.7.1 Sketch-Editor

The Sketch-Editor creates simple system sketches. We favour CAD for more complex details (see Chapter 3.3.).

The Sketch-Editor is not based on a CAD-like technology. The graphics are generated with the aid of three special character sets. The corresponding drawing elements are consecutively sequenced and intelligently linked with one another at the touch of a button. Beams, frames, roofs and supports are marked with the associated loads and dimensionings.

Insert-Image and CAD-System sketch
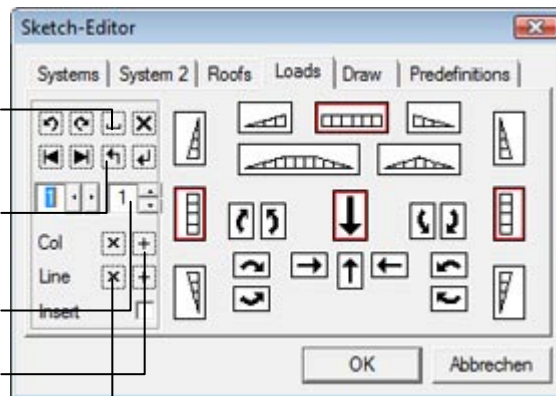
Undo / Redo / Insert spaces / Delete character

Go to start/end of line / Go to start/end of drawing

Current X/Y position and controller for movinbg

Delete and insert column

Delete and insert line

3.7.2 General functions

- **Undo function:** A maximum of five steps can be undone.
- **Redo function:** The last two steps of the Undo function can be redone.
- **Enter blank spaces:** Writes a blank space at the current cursor position.
- **Delete character:** In Overwrite mode the selected character is deleted; in Insert mode the character to the right of the cursor is deleted.
- **To Start of Line:** Positions the cursor at the start of the current line (Position 1).
- **To End of Line:** Positions the cursor at the end of the current line, i.e. after the last drawing element of this line.
- **To Start of Image:** Positions the cursor at the start of the first image line.
- **To End of Image:** Positions the cursor at the start of the last image line.
- **x-Position:** X position of the cursor. The associated controller can be used to move the cursor in the horizontal direction (mouse wheel can be used).
- **y-Position:** Y position of the cursor. The associated controller can be used to move the cursor in the vertical direction (you can use the mouse wheel).

- **Delete/Insert column:** Allows columns to be deleted or inserted. In Overwrite mode Insert copies the column to the left of the cursor; in *Insert* mode, blank spaces are inserted.
- **Delete/Insert line:** Allows lines to be deleted or inserted.
- **Insert:** Toggles between Overwrite and Insert mode. If the checkbox is ticked, Insert mode is active, i.e. the drawing element is inserted at the current cursor position. The cursor image is shown as an arrow to the right. In Overwrite mode, in contrast, the current cursor position is indicated by a selected character. In this mode, a new drawing element overwrites parts of the existing image.

Notes to the functions

- **Systems:** after inserting an object, the cursor is normally at the location where the next field can be drawn.
- **Roofs:** Because of the technology only diagrammatic figures with a pitch of 30°, 45° and 60° are possible.
- **Modifications:** Double-clicking on the diagram is the easiest method.
- **Match size:** Standard size or current size can be configured and altered under Predefinitions.

3.7.3 "Systems" tab

Beams: After inserting the first field, the cursor is at the location where the next field can be joined.


Frames: After insertion, the cursor is always at the upper right corner. The next frame element can be joined at this location. For multi-storey frames, draw the lower floor first, then place the cursor into the top left corner and draw the next floor. Cantilevers can be connected at any point of the frame. To do this, the cursor must be at the connection point. The left cantilever is marked to the left of the cursor and the right one is marked to the right.
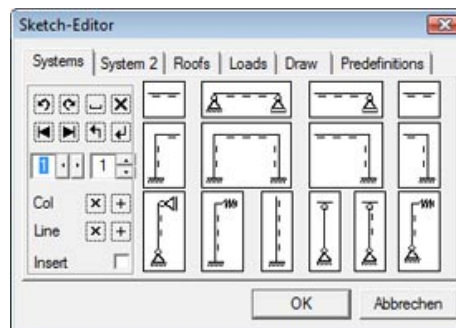
Supports: The supports must only be defined above the system height. Hinged columns are connected to the frame if the cursor is on the ledger and the downwards drawing direction is selected.

3.7.4 "System 2" tab

Dimensioning: The horizontal dimensioning can be marked to the left or right. The vertical dimensioning can be marked upwards or downwards. The cursor is then at the next possible connection point to continue the dimension chain. The length of the dimension mark must be specified for the height indication. The angle dimensioning writes a symbol to specify the angle.
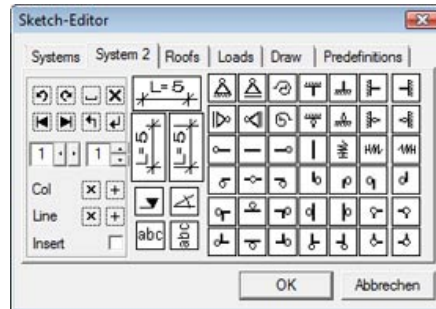
Bearings and joints: The selected symbol is written at the current position. The fixed and loose bearings replace the above symbol accordingly.

3.7.5 "Roofs" tab

Rafters: Just like the beams, the procedure is from left to right. The left cantilever can also be inserted to the left if there is sufficient space. The roof pitch can be 30°, 45° and 60°.

Roofs: There are three roof systems available. These roof systems are always symmetrical but can however be supplemented by individual rafter sections. The roof width and the distance from the inferior purlin to the collar beam or to the centre purlin must be specified. The roof width must be a multiple of two and the distance to the interior purlin must be less than half the roof width.
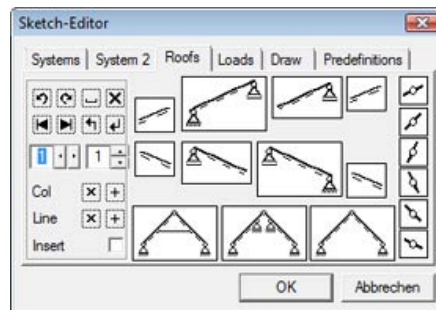
Joints: There are joints on the right side as individual characters for the corresponding roof pitches. They are inserted at the cursor position.

Notes: The angle of these sections must be identical in order to connect rafters and roof members together. Please check the character direction. Not all dimensions are possible, especially at an angle of 30° due to the geometric conditions. The choice of dimension should be made via the controller or the mouse wheel. Only drawable values are recommended here.

3.7.6 "Loads" tab

Triangular and area loads: The loads with vertical direction are always intelligently interconnected so that you are able to draw almost any load images. The loads in the horizontal direction are not interlinked.

Load arrows: The load arrows are defined by their direction and their length. The appropriate arrow must be selected. The character direction is requested. This is independent of the direction of the arrowhead.
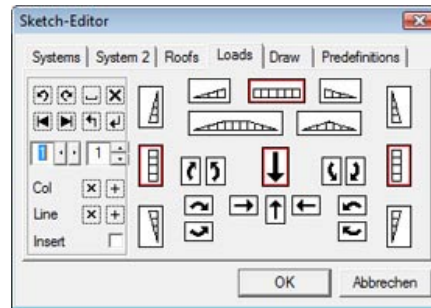
Moments: Moments are inserted as individual characters. Their size cannot be influenced.

3.7.7 "Draw" tab

Elements for individual drawings are contained on this tab. It is possible to draw simple cross-sections or details with this collection.

Code button: You can select and draw individual characters from the three VCmaster fonts with this button. The character sets can be viewed by opening and, if necessary, printing the ZeichenXVCmaster.pdf file in the VCmaster directory. Select the font and then the ASCII number accordingly.
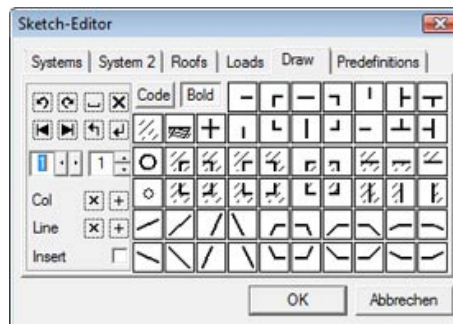
Bold button: If Bold is active, the characters are written in a heavier font. The corresponding mode can be seen on the depressed button or on the display of the individual characters.

Notes: In the Bold mode, the characters have the same thickness as the beam, frame, support and roof elements. While drawing, the cursor can be positioned so that drawing can be continued. It is therefore possible to draw horizontal and vertical lines by repeatedly clicking on the relevant character.

Individual buttons:
Earth level can be indicated with this button.
Reinforcing bars can be shown with these buttons.
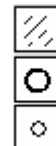
3.7.8 "Predefinitions" tab

Start size: The start size is the font size that is preset if a new diagram is inserted.

Modify size: The font size of the current diagram can be changed here. You can track the effects directly in the VCmaster document. An approximate specification for enlarging the drawing can be found immediately below.
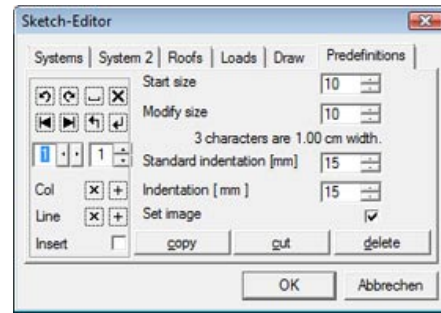
Standard indentation: Here you can set at which indent the graphic should be started.

Indentation: You can shift the current diagram in the document by indenting.
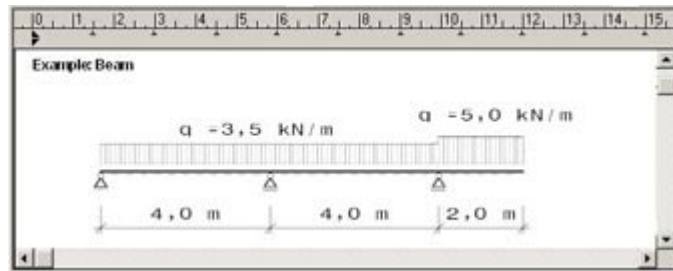
copy, cut, delete:
copy - Copy to clipboard
delete - Deletes the current drawing
cut - Copies and deletes

Example

3.8 Combining loads according to DIN 1055

3.8.1 Load module (German language only)

The Load module is a completely newly developed software that connects the features of a viewer with those of a database. This enables the electronic administration of standard texts, load specifications and load coefficients. This absolutely new technology makes it possible to completely replace searching through the literature. The particular advantage is being able to carry out further calculations with all numerical values. Text passages from standards can be transferred to the structural analysis by clicking with the mouse

The especially interesting feature is that all load tables can be extended. Loads or coefficients can be added individually with the database module.

The Load module, including the tables from DIN 1055, DIN 1055 new, DIN 4421, DIN 18218 and DIN 1072, is available as an option.
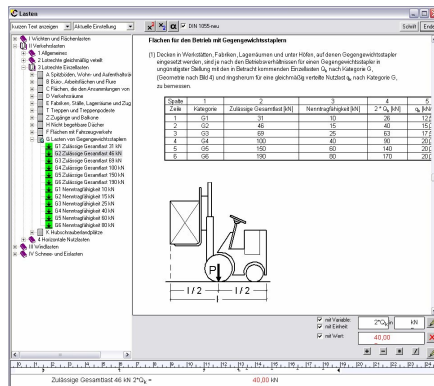
Procedure

1) Select the load type in the left window.

2) Select the text layout and calculation line format (top left)

3) Transfer the load to VCmaster. The value can be multiplied here (e.g. with d / see example below).

4) If necessary, transfer the next load. A table is added up at the end in VCmaster.

3.8.2 Special features

Loads are compiled line-by-line in the dialog. Thus you can work in VCmaster in parallel. Before transferring into VCmaster, determine the position where the load is to be inserted.

You can insert several loads at various locations in the document without ending the dialog. The dialog remains in the foreground. If you do not need the dialog immediately but you do not want to end it, you can minimise the dialog and activate it again later via the Task bar.

By clicking to tick the box before *with variable, with unit or with value*, the three fields can be activated and deactivated. They appear on a grey background when deactivated. The information from the selected fields are transferred into the load line. Alignment is carried out using tabs in accordance with the selected calculation line format.

3.8.3 Manual entries

If you want to multiply a load with a corresponding thickness, for example, click on the multiplication sign and the thickness specification as a numerical value or a variable defined in VCmaster (d = 12 cm in the example).
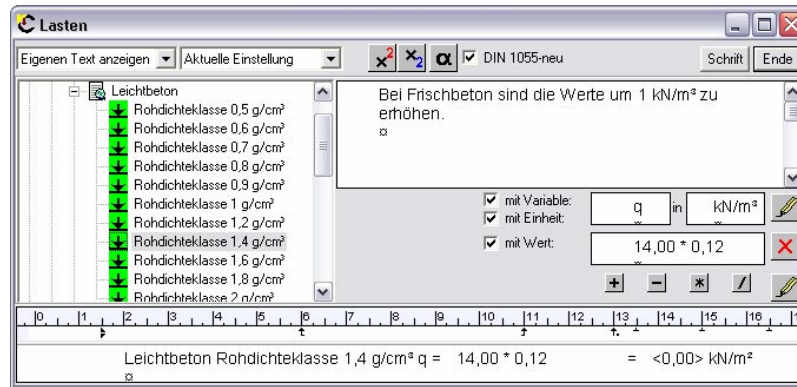

If an arithmetic operator is entered in the field, the dialog assumes you want to make a calculation.

It converts the contents into the load line. You can see how this line will appear after the transfer. The line must be inserted in VCmaster for the calculation to be carried out; "<0.00>" is therefore written instead of a result. The text in front of the variable can be changed directly in the load line

3.8.4 Formatting

All the formats defined in VCmaster are available in the Load module. These can be set by clicking on the right selection field. The load line will be realigned.

The left selection field allows selection of the text length and hence the scope of information to be written in front of the variable in the load line. This text can be changed as required in the load line.
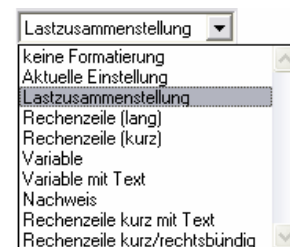
3.8.5 Explanations

The field with the explanations is automatically enlarged if you selected a note from the standard in the tree. If a load has been selected, this normally contains important information on the selected table values. These notes and explanations are sometimes very extensive. The field is enlarged by double-clicking on the text field. By double-clicking again, the original condition can be restored.

3.9 Knowledge database

Purpose

Valuable know-how is collected in all phases of planning, design and development activity. These important resources are wasted if they are not generally and permanently available. When needed, all relevant information must be available to those project team members who require it.

The complex software solutions available in the field of knowledge management correspond little to the practical requirements of the engineer in terms of efficiency and handling. Our objective was to create a simple and easily understood means of compiling and describing digital documents and templates by topic.
For this purpose, the user can create VCmaster Wikis which are linked to any number and type of other documents. The Wikis generally contain explanatory texts and comments. Any document format and storage location can be used. The only prerequisite is that the PC is able to open a document of the specified type. Assignment is by means of the file extension.

What is a Wiki?

Quotation: A Wiki (Hawaiian for "quick")is a hypertext system for web sites whose contents are not only read by users but can also be modified online directly in the browser. The best-known application is the Wikipedia online encyclopedia (Source: Wikipedia).
We have adopted the basic idea of cooperative working and the compilation of information. We therefore use the term Wiki, although we have adapted the procedure to the practical needs of the enginee.

Fundamental properties of a VCmaster Wiki

A VCmaster Wiki can be described as follows:

- This is a file in VCmaster format (*.hed). It can be edited by the program like any other text file. This file is the basis for the collection of information by topic because any files can be linked with it.
- Linking is carried out via so-called hyperlinks. Everyone is familiar with this technology from the HTML pages of the Internet. A VCmaster Wiki can establish links to any file formats.
- The storage location of the linked files is immaterial. The file can be stored on the hard disk, on the network or even on the Internet.

- The application is assigned by means of the file extension of the linked file which is to be opened by clicking on the hyperlink. This is done automatically based on the Windows system settings. Example: If a PDF file is linked, the program which is assigned the ".pdf" file extension starts automatically. This is usually Acrobat Reader. The default browser opens the HTML-page.

- Wikis are opened with the Template Explorer. The procedure is basically the same as Loading a template.

Application examples

Wikis can be used in lots of different ways. The fields of application are e.g.:

File-Knowledge database

- Collection of calculation templates on a specific topic. One example is our structural engineering formula collection which contains formulae for static systems, strength of materials and geometry (see figure on the right).

- Documentation of calculation templates: For example manufacturer's documentation, measurement tables or information from the literature can be assigned to a template.

- Description of templates: The fields of application and boundary conditions of one or more templates can be explained (see figure on the right).

- Collection of external data: Documents with standards or guidelines can be clearly linked and compiled in a VCmaster Wiki. Access to such information is thus considerably more efficient.
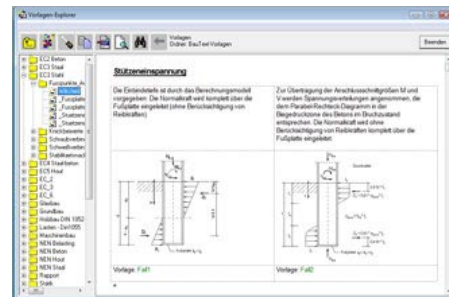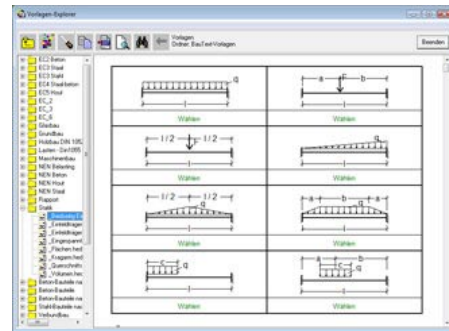
Link data
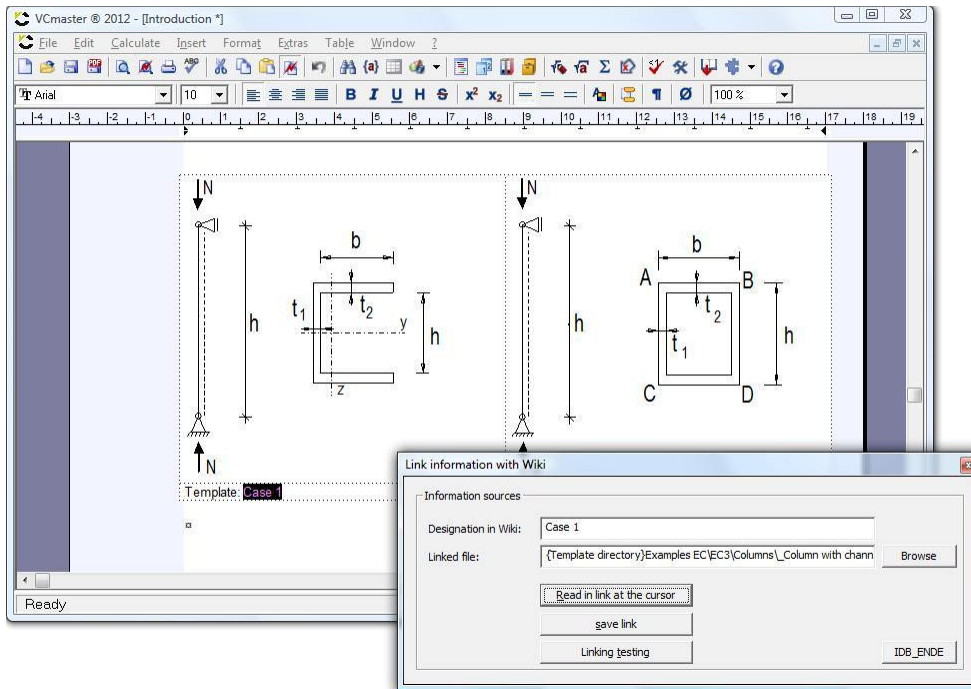
Figure: Editing the links

Designation in Wiki:	Text to be displayed
Linked file:	File to be opened when clicking on the designation
Read link on the cursor:	Reading of the data at the cursor position in order to edit the link
Save link:	Save entry
Testing the link:	Function test of an entered link

Special features

It is immaterial whether the files are VCmaster files or not. VCmaster files are opened in the Template Explorer. For all other files, the Template Explorer opens the application assigned to the file extension.

Special case: Link to a template

When compiling template libraries, it can be useful to have references available to different points. To simplify maintenance of the template, it is sensible only to generate one reference (similar to linking in the Windows operating system). An empty file is created for this which contains solely a link to this template in the first line. The Template Explorer recognises this and automatically opens the linked file.

4. Organising and designing

The calculating capacity and compilation of documents are the main focus in the first chapters. VCmaster also includes many tools for designing documents. For example, this applies to:

- the page header with page numbering
- the cover sheet
- the table of contents
- headings

and further useful tools such as

- data fields and file information
- the navigator (see right)
- automatic data backup
- the organisation on the PC
- and export functions
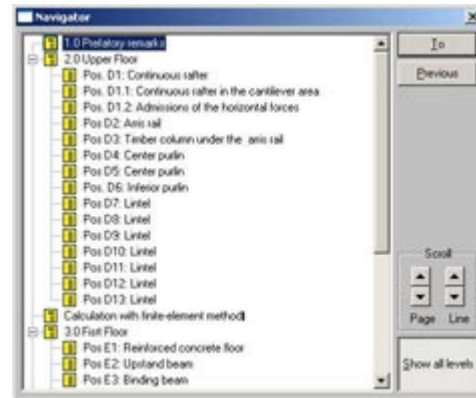
Many of the functions described in the chapter cannot be looked at in isolation from one another because they interact with each other. It is, therefore, advisable to read the whole chapter and not only individual sections of it.

Important information on the interaction of functions:

- **The headings are automatically adopted in the table of contents**. The table of contents is designed according to the hierarchy of the chapter.
- **Headings and Navigator:** The headings are also used to navigate in the document (see image above).
- **Page numbering and page header:** The page numbers are created automatically. The numbering includes inserted or modified pages and hidden areas.
- **Data fields:** The page numbers, table of contents, etc. are placed by means of the data fields. These fields are automatically assigned with the corresponding data during printing.
- **File information:** Project data can be used consistently in headers and footers or the first page. The corresponding data (e.g. project name) is automatically preallocated for the current project.
- **Headings and Export or Import:** During a PDF export, the document structure is generated from the headings and saved with the PDF file. When importing from reference projects, data can be searched for and adopted on the basis of the chapter structure.

4.1 Page headers

Entering headers and footers

Select the *Edit - Page-header and -footer* function (see below). Enter the headers and footers. Save this file as a standard template under *File - Template manager - Save as standard template*.

The standard template contains the current header and is automatically loaded when the program starts. Information on the project is entered using fields and can be changed without having to edit the header again. If several headers are used, it may also be worthwhile to save the header as a format template. When the project is changed, this format template is loaded with *File - Template manager - Load formatted template* and *Save as standard template*. This saves re-entering.
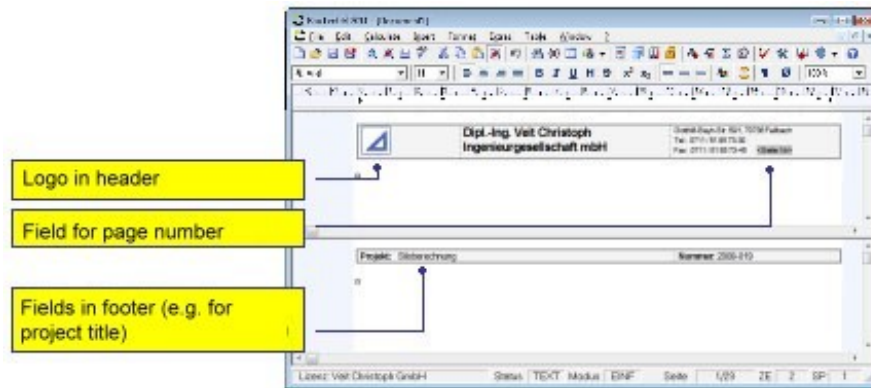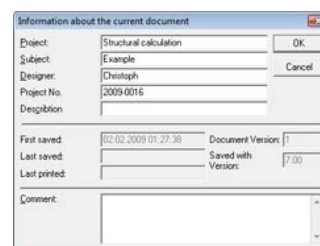

The header is displayed in the upper area and the footer in the lower area of the split window. It doesn't matter whether the fields are entered in the header or the footer. The project and position description can, of course, also be placed in the header (not shown in the example).

Note on tables in headers and footers

To place text blocks and graphics next to each other, please use the simple table. The frames can be shown or hidden. If you use a table, please leave a blank line before and after the table (to do this, you may need to reduce the top edge of the page). Please design the headers and footers using the VCmaster tables only. Headers from other programs that were copied via the clipboard sometimes cause problems later.

Fields in headers and footers

The project data are linked to the header via fields. Prerequisite is that the data for the project are entered under *File – Project data - File information* (see figure). The headers and footers are automatically updated.

The standard template contains the current header and is automatically loaded when the program starts.

Page numbers, index etc. are placed by data fields.

Chapter headings and page numbers

Chapter headings and page numbers can be set in headers and footers via the *Fields - Fields with updating* function. See also Chapter 4.3 Headings and table of contents.

Note:
VCmaster creates the required entries for print or print preview. If quick view is being operated, there is no update.

There are two fields available which allow consistent page numbering: *Page No. after 'Page'*: and *Page No*. The difference here is that the first field automatically writes the text "Page:" before the page number if there is a page number, otherwise just the actual number appears.
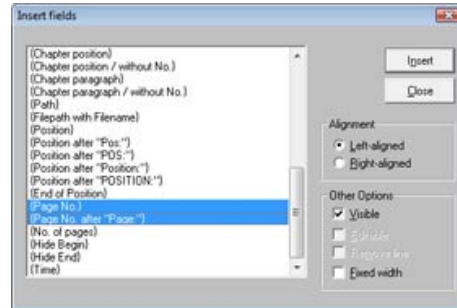
The function *Insert- Fields – Link to project manager* is available for transferring information from the project administration.
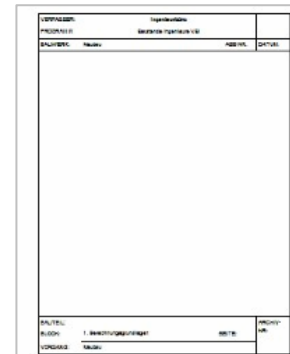
Frames and background illustrations

Any graphic can be used as a background in the *As background image* function. Two different background illustrations can be specified. The first one is used on the pages without headers and footers, the second on the other pages. See also Chapter 4.3 Headings and table of contents.

Background illustrations can also be frames if the document is to be issued on standard pages. Another area of application is design where this is specified with respect to Corporate Identity.

The procedure is as follows:

1) Create or open the required background illustration with a program of your choice (e.g. CAD program, PDF document, etc.).

2) Print the document via the t2W interface. The interface window opens.

3) Select *File - As Page Frame* from the menu. Save this file under a name.

4) Swap to VCmaster. Under *File - Settings - Print options / Hiding*, select background illustration 1 for pages without headers and footers and background illustration 2 for pages with headers and footers.

4.2 Functions for page numbering

With the consistent alignment of VCmaster as a tool for digitally setting up structural analyses, the management of modified and added pages plays an increasingly important role. The functions for page numbering have been extended accordingly. Placeholders can also be inserted for pages from external programs. The following options are available:

- **Inserted pages:** These pages are given separate numbering in addition to the existing number. For example, if three pages are added after page 16, these are given the page numbers 16.1, 16.2 and 16.3.

- **Modified pages:** If pages are modified, they can be provided with an index. For example, if pages 12-15 are modified, the page numbers will be 12a to 15a. Any upper/lower case letter can be specified as the index.

- **Place holder for pages:**
  Any pages, such as the outputs of other programs, can therefore be integrated in the document later. The number of pages to be inserted later is specified by the user.

  These are skipped when numbering the pages. The table of contents also takes them into account. A heading can even be specified for the pages to be added, e.g. "Electronic calculation with FE program". Example: If ten pages of another program are to be included after page 23, the 24th page is given page number 34 on the printout, etc.

- **Chapters:** Chapters can begin with a new page number (see Section with specified page number). A chapter ID can be prefixed to the page number.
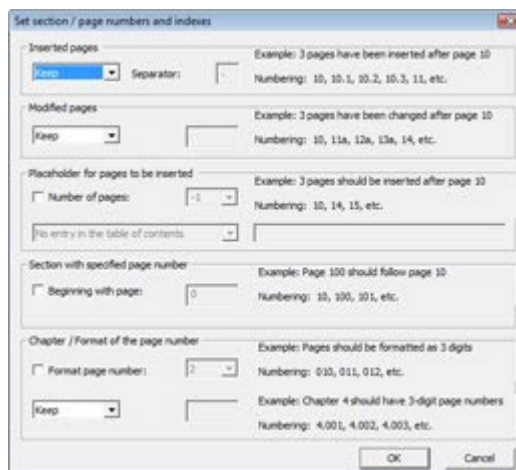
Section change in VCmaster

Inserted and modified pages each require a start and an end mark. For transparent assignment, it is useful to insert a fixed page break after the start and end mark or to set the marks before the corresponding breaks. The input is similar for modified pages.

Leaving the option has the effect that the preceding data is retained when new data is entered. This makes nesting of the functions possible. For example, an inserted page can be given the index of a modification (e.g. 12.5a).

In a placeholder, the number of pages that are to be inserted later is specified by the user. These are skipped in the page numbering. A heading can even be specified for the pages to be added, e.g. "Electronic calculation with FE program". Example: If ten pages of another program are to be included after page 23, the 24th page is given page number 34 when printed, etc.

The table of contents includes all information. Supplements can be printed separately (see *File - Print*).

Edit a section change

All details can be changed with the context menu (right mouse key). The section change can be copied and deleted in the context menu.
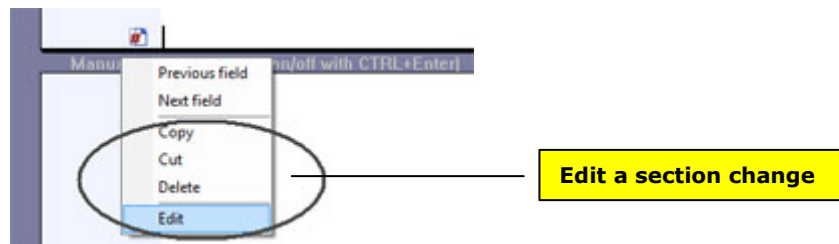
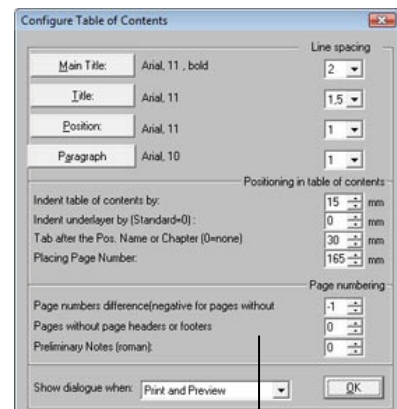**Cover sheets and preliminary remarks**

The deactivation of page numbering on the cover sheet and the numbering of preliminary remark pages with Roman numerals are controlled by the automatic table of contents.

We have decided on this procedure because this enables the normal case to be realised without the additional setting of section formatting.

The dialog is displayed in the page preview and when printing if a table of contents is present in the text. See also next chapter.

The following order is assumed:

1) **Pages without numbers**, optionally with or without header
2) **Preliminary remarks** with Roman numerals (I-XX)
3) **Normal pages** beginning with page number 1

4.3 Headings and table of contents

Headings

Any lines can be marked as headings. There are four different levels: Main Title, Heading, Position and Paragraph. In addition to designing the heading, it is also possible to select whether it is entered in the table of contents. At the same time, the navigator uses this information to display the document structure**.**

The position number or designation that is behind "Pos:" or "Position:" can be specified in the header for printing. To do this, the line must be defined as a position and the corresponding field placed in the header (for more details, see Chapter 4.1). This is position "202" in the example below. Please do not enter any empty spaces in the position designation.

> Example: **Pos: 202 Console**

Generating the table of contents

The table of contents can either be generated as text or completely automatically positioned via the Field function.

In the former, just a text is created. If the page numbers change, they must be corrected manually or the table regenerated. To do this, use the *Table of contents as text* function under *Insert - Fields*.

In the latter, the position of the table is defined using a field. The table of contents is automatically generated at this location for the printout and/or page preview. Please use the Table of Contents field function (under *Insert - Fields - Fields with updating*).

Designing the table of contents

The cover sheet and pages with preliminary remarks are normally part of a document. The first page often has no page header. Preliminary remarks are numbered using Roman numerals if necessary. The prompt for printing or page preview appears when generating the table of contents. This window allows heading levels (e.g. of paragraphs) to be switched off.

Fonts, positioning of page numbers and line spacing are administered with *Extras – Settings.*
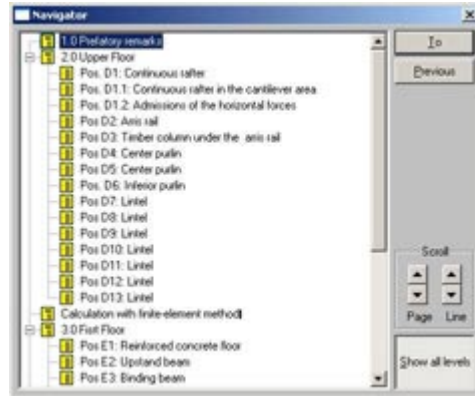
4.4 Navigating in the document

F6

Extras–Navigator

Navigator

The navigator allows control of the display via the document structure (see figure). Headings and positions for this must be marked as such (see Chapter 4.2). The *Back view window* uses the same data.
The navigator can be started in parallel to the program. In this case, the current chapter is displayed when working in VCmaster.

Turn and View Page

Information from preceding pages is often required for structural analyses. The *Turn + View Page* function allows previous pages to be displayed. Skipping back to the current view is possible. This means the values required for subsequent calculation can be viewed and copied. Note: The *Back view window* is also suitable for this.

This is called up by pressing the middle mouse wheel. The navigator allows control of the display via the document structure (see figure). Headings and positions for this must be marked as such. For details, see also Chapter Headings.

Quick deletion and copying of chapters

A context menu is assigned to the headings (click right mouse key). The complete chapter can be edited here.

Unlike deleting, the heading remains intact when cleared. A blank line is released. In the case of modifications, a new transfer can be added quickly and easily at this location. This is particularly useful when using the t2W interface.
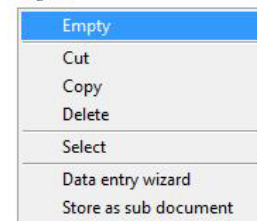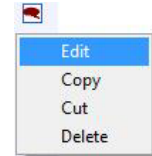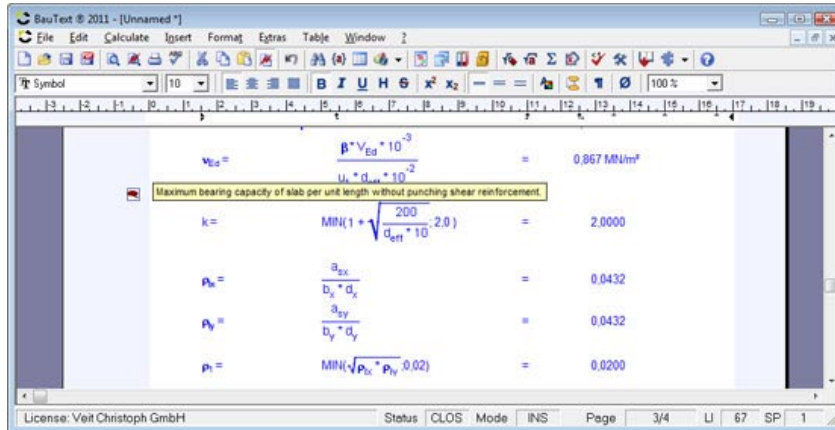
4.5 Notes and comments

Notes, supplementary information and explanations make it easier to use the templates. The VCmaster document can save this information. The entries are displayed on the screen, but not printed. The context menu is available for editing.
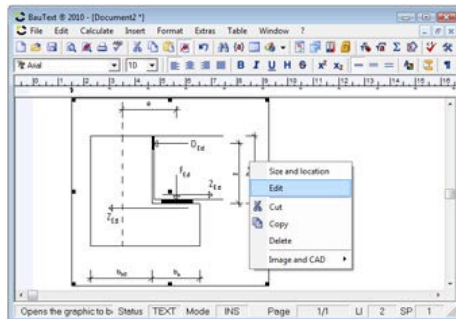
Example:
Comment in VCmaster

4.6 Editing images

Size and location

If a image is marked, the displayed context menu appears by clicking the right mouse key.

The dialog for formatting the image is called up with Size and Location. You can scale or shift the image horizontally.

Editing graphics

System diagrams, details and the transfer of the t2W interface must be frequently edited or comleted in practice. You can add or modify comments, notes or graphic elements. Deleting areas and rotating the graphic are also possible.
The user must select the graphic. The dialog for editing the graphic can then be started via the Edit item in the context menu or by double-clicking.

The following graphic elements have been realised:

- **Lines** with different stroke weights
- **Rectangles** (filled or as frames)
- **Text** with access to all installed Windows fonts

The following functions are also available:

- **Rotate** the entire graphic in steps of 90° or counterclockwise.
- **Editing** the elements mentioned above for better placement or for correcting input errors.

□.	Rechteck
○	Kreise
\	Linien
T	Text
△	Eingaben ändern
■	Farbe wählen
—	Strichstärke
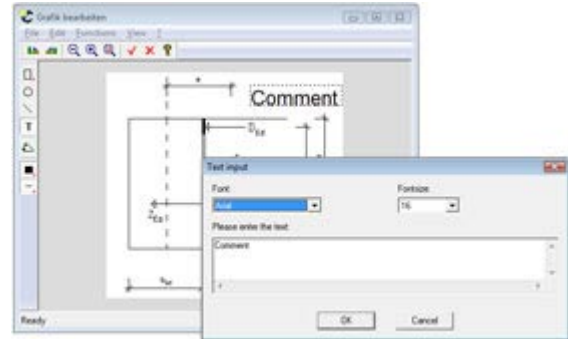
Note: The focal point in the development of this tool was the aim of adding information to existing graphics. At no time did we ever want to develop a new CAD program. We still recommend using the available CAD software for creating graphics. Many interfaces allow the transfer of graphics from any other program. Graphics from CAD programs can be directly integrated in VCmaster using the OLE interface. Prerequisite is that they also have the corresponding interface.
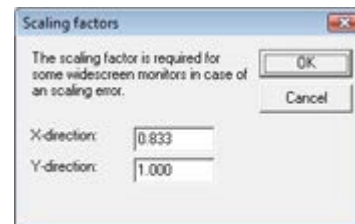
Scaling in the case of distortions

For some wide screens, a scaling factor must be specified if the display of the transfer is distorted.

This is usually calculated from: $\dfrac{P_y * 4}{P_x * 3}$

P_x = horizontal screen pixels
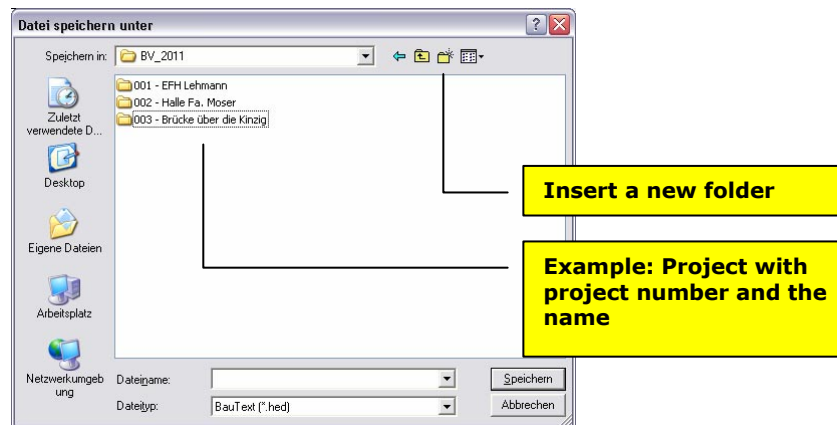P_y = vertical screen pixels

4.7 Instructions for data organisation

4.7.1 Organisation on the PC and in the network

We recommend specifying different directories for the program, the templates and the data. For work groups, templates and data can be placed on network hard drives.

We favour a central path for the projects (e.g. d:\projects). We create the project folders under this directory. The description can be a project number and the name. In our engineering office all data (including the other programs) are saved using this structure. In addition, we have a central directory for templates and libraries (e.g. d:\lib). We also put data of all programs here. The VCmaster templates are then located under d:\lib\VCmaster, for example. Please bear this in mind during the installation as the templates can only be moved by reinstalling them.

You can, of course, configure your PC as you wish, but the structure mentioned above has advantages for searching and reusing calculations as well as for backing up projects and libraries (the latter are often forgotten).

VCmaster does not include special project administration. The path under which a project was saved last time is taken as the default for opening and saving.

The size of the calculation that can be administrated in a document generally depends on the processor performance. With optimum hardware, the limit is 300 to 500 pages. Larger calculations are joined together at the end via the Batch function (see below).

The larger the monitor, the more pleasant and ergonomic the work. Functions such as the *Back view window* and *From reference project* can only be used efficiently if two views can be displayed at the same time.

4.7.2 Working with sub documents

VCmaster supports the division of a document into several files. In the process, one document acts as the main document which is linked with one or more sub documents. The result of this for extensive documentation is that central memory is saved and the processing is accelerated. You can thereby edit targeted sections without opening the whole document. Additionally, you have a better overview of the storage process as large sections or items, such as framework or FE calculations are saved in separate files.

When printing or calling up the page view in the main document, the whole document is compiled. No updating is carried out with Quick view activated.

Principle

VCmaster also offers two basic options:

- **An existing document is linked as a sub document with the main document.** This makes sense if the sub document exists already and the whole documentation is to be compiled. To do this, select the sub document function in the window shown above.

- **A part of the document is stored in a sub document.** This option is generally used if it is established when working with the document that it too large and editing it is taking too long.
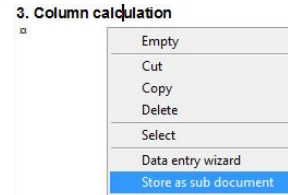
File name and storage location

The stored file can be linked in various ways:

- **Relative to the main document:** This generally makes sense as all files for a project can be assigned again when copying files. When doing this, the sub documents should be saved in the same directory as the main document (cf. example in the illustration above).

Example:
Linked file: attachement.hed
Current path: D:\Projects\2010\015\

In some cases it may be a good idea to set up a separate sub directory for the sub documents.

Example:
Linked File: sub documents\attachement.hed
Current path: D:\Projects\2010\015\

- **Fixed data file path:** This only makes sense if information is to be linked with the document which is not usually edited. This could be, e.g. documentation from the manufacturer, norms or general preliminary notes. The advantage is that these are only stored once.
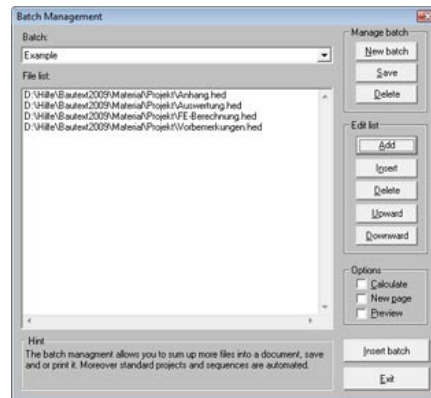
Important note

- The functions described above require the storage location of the main document. This means: The main document must have been saved in advance at least once.

- When the project is transferred, all linked subfiles must be transferred as well. It is therefore recommended that a folder be set up for each project and that the main file and subfiles are saved in this folder (see above).

- When copying a link the linked subfile is also physically copied onto the hard drive. "attachement.hed" becomes "attachement001.hed", for example. This prevents a sub document being linked several times with a main document. Otherwise, it could be that when editing a sub document the complete documentation is inadvertently changed in various places. The user should observe this when manually linking documents.

- The headers and footers for the main document are decisive.

4.7.3 Batch management

A batch is a list of several files that can be combined to form a single document.

For larger projects, it makes sense to divide the documentation over a number of files. The batch management option allows you to combine them into a single document. This is required to create a table of contents, for example.

Batch management can be called up via the *Extras - Batch management* menu item. Existing batches are inserted at the cursor position via *Insert Batch*.

Important note: The batch is normally inserted in an empty file which only contains the header and footer with page numbering. Please note that headers and footers of this document must agree in the height with those of the batch files. If not, it cannot be guaranteed that the page breaks will be set correctly.

Edit list: The file list that is displayed on the left in the large field can be extended and edited. Add is used to append the selected file at the end. *Insert* is used to integrate it before the file on the blue background. *Delete* is used to remove the current file from the list. *Upward* and *Downward* are used to change the order of the batch files in the list.

Options: Select:
- whether the files should be recalculated when inserting the batch with Calculate,
- whether the files are each inserted on a new page with New page or,
- whether to switch directly to the page preview with Preview.

4.7.4 Hiding areas

Insert-Fields-Fields with updating
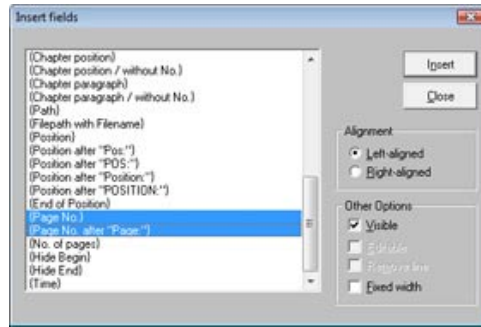
The *Hide begin/Hide End* field functions are used to hide areas on the printout.

See also Chapter 4.1.

4.8 Export

File-Export

Statics as a digital PDF file (see illustration)

VCmaster exports the data in the following formats:

- Adobe Acrobat (*.pdf)
- Microsoft Word (*.doc)
- Rich Text File (*.rtf)
- ASCII-Text (*.txt)
- ZIP-File (*.zip)

Please note that the calculating intelligence is lost through the export. Saving in VCmaster format is mandatory.
We recommend the PDF format for forwarding calculations to third parties.
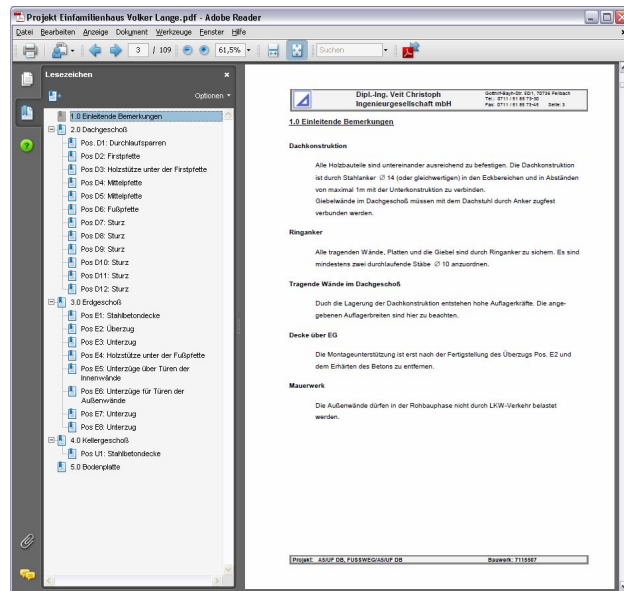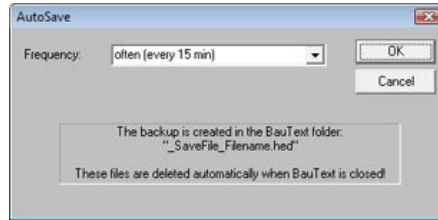

4.8.1 ZIP format

File-Export-Save ZIP file

The VCmaster file is compressed in ZIP format. If t2W-Hybrid Objects are present, the corresponding sub-folder is also exported in the ZIP file. This is especially advantageous when transferring data in order to ensure complete datasets.

4.9 Automatic data backup

The time interval for backing up the document is specified under *Extras - Settings - Automatic file saving*.

VCmaster also copies the files with the name "_SaveFile*.* " into BAK files (double data backup). These are automatically deleted after 72 hours.
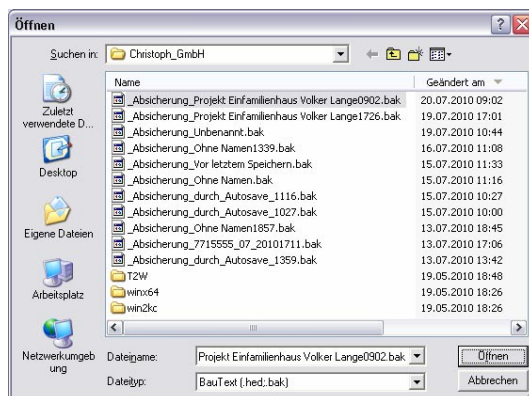
The file name contains the time of the backup. If the backup copy is required, the BAK file must be renamed to a HED file or opened with the *Open automatic backups* function mentioned below. All backup files are located in the Application Data directory under "Christoph_GmbH (see below). They are called "_SaveFile*.* ".
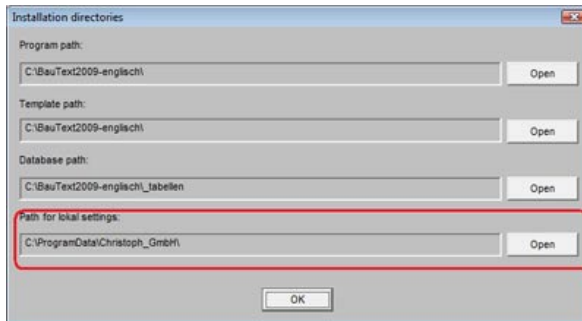
Installation directories

Opening backups

Data backups can be opened at any time under *Extras*.

If VCmaster has not been ended correctly, the program starts this dialog automatically.

Example: Backup of file "Document1.hed".

5. Instructions for editing text

All text processing functions correspond to the Windows standard. The most important instructions for effective use are given in this chapter. We nevertheless recommend that users who have a good working knowledge of Windows also read this chapter as some specific questions are explained.
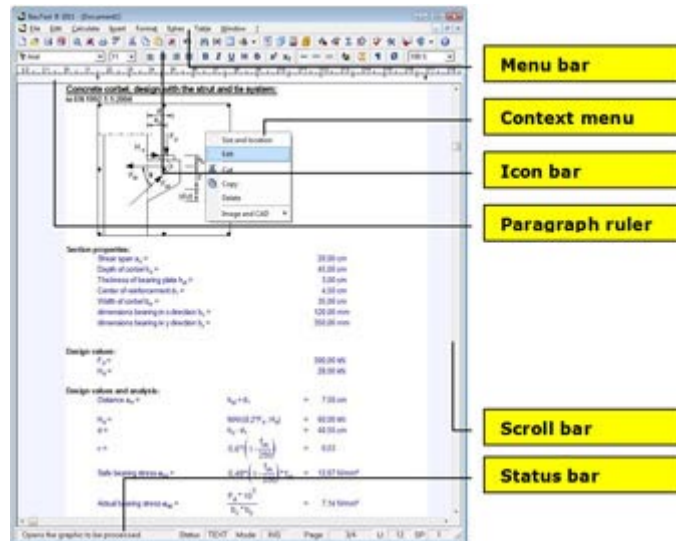
For example, this applies to:

- special characters,
- selecting and copying,
- tabs and control characters and
- tables.

Note: We do not explain basic Windows functions. We assume a basic knowledge of Windows text editing, tabs and the marking and formatting of text.

User interface

5.1 Selecting, copying and cutting

In order to edit text (e.g., change, delete, copy font type, etc.), the text must be selected. Use the mouse or keyboard for this.

Selecting

1) cut
2) copy
3) paste
4) fast copying on/off

Notes

- Selecting with the keyboard is often more precise and efficient. To do this, press the SHIFT key and move the Picture up or Picture down key or the cursor keys. This procedure is recommended for marking larger areas.

- Working with shortcut keys for frequently used functions is quicker than using the mouse. Use function keys such as CTRL+C, CTRL+V and CTRL+X. This is considerably quicker when writing than using the mouse. Most keyboard combinations are the same in all Windows programs. For details, see Chapter 5.5.

- Blank lines: If the line is locked because it is a calculation line, a line for writing can be inserted using Edit - Line -Insert blank line (CTRL+K).

Fast copying on/off

If fast copying is activated, copying operations are only possible within VCmaster. This saves a lot of memory capacity and thus considerably accelerates the copying of large segments or graphics. To copy into other programs, the option must be de-activated. For copying large JPG files a query appears asking if you wish to copy externally.

Properties of calculation lines

- Calculation lines and tables must always be moved or copied as a complete entity. This is checked by the program.

- Please place the cursor at the leftmost position when inserting calculation lines. Calculation lines always require a complete line. Incorrect inputs are normally corrected by the program.

- VCmaster verifies that all calculation results are okay when inserting, moving, deleting or copying. The program automatically checks the consequence of the process and adjusts all affected results.

- This means it is possible, for example, to copy a structural analysis if it needs to be carried out in the same way at a number of measurement positions. The new input values are immediately taken into account when inserted.

Edit-

Cut
CTRL+X

Copy
CTRL+C

Paste
CTRL+V

Delete
DEL

Note:
Selecting with the keyboard is often more precise and efficient.

Working with shortcut keys is quicker.

Edit-Line

Insert blank line
CTRL+K

Cut line
CTRL+Y

**Copy line**
CTRL+Z

5.2 Tabs and control characters

**Format-
Paragraph / Tab**

**The exact placing of
text is only possible
using tabs.**

Basis

The exact placing of text is only possible
using tabs. The following tabs are
differentiated for this:

Note, e.g.: Specify the placing of tabs (in
cm) under *Format – Paragraph / Tab* (see
mask below). Then write the words
"Column1", "Column2", "Column3", and
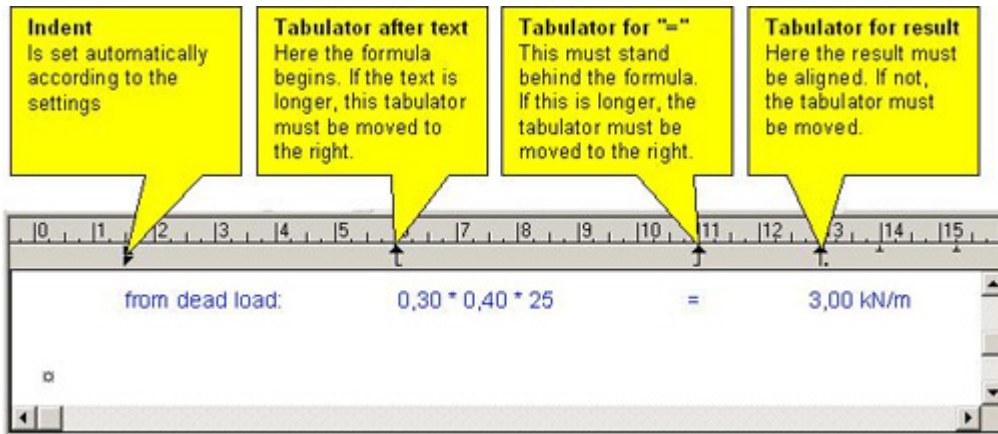"24.00". Press the TAB key after each word.
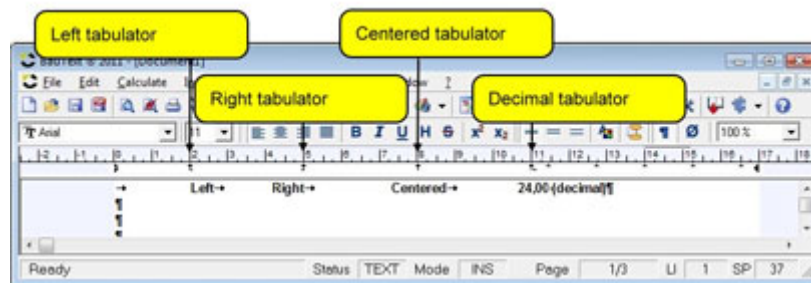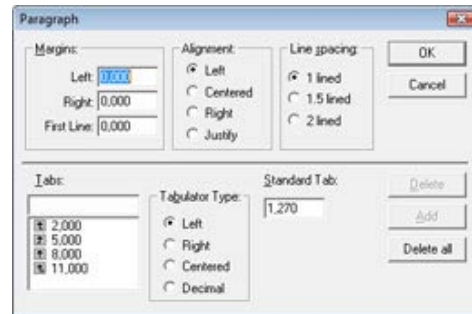
Editing tabs

Shifting a tab: Click the line you want to change with the mouse pointer. Move the
mouse pointer with the tip exactly on the tab symbol to be shifted. Press and hold down
the left mouse key. Move the mouse pointer along the line ruler until it comes to the
desired position. Release the mouse key again. The tab and the characters you have
positioned are now shifted to the new position.

Deleting a tab: Click the line where you want to remove the tab. Point to the
corresponding tab symbol with the mouse pointer. Press and hold down the left mouse key
and drag the mouse pointer downwards out of the line ruler. Release the mouse key again.
The tab will be removed and the display readjusted.

Important! Never move a tab beyond another tab**.**

Properties of calculation lines

Tabs are also used for formatting calculation lines. These are set automatically by the calculating component. VCmaster requires three tabs for each calculation line:

Indent
Is set automatically according to the settings

Tabulator after text
Here the formula begins. If the text is longer, this tabulator must be moved to the right.

Tabulator for "="
This must stand behind the formula. If this is longer, the tabulator must be moved to the right.

Tabulator for result
Here the result must be aligned. If not, the tabulator must be moved.

from dead load: 0,30 * 0,40 * 25 = 3,00 kN/m

In calculation lines: A typical effect of Windows programs is that at times the tab needs to be moved to the right in order to move the formula to the left. This applies, for example, if 6 cm is provided for the text but the formula contains a longer text. In this case, please move the first tab in the paragraph ruler (see above) to the right until it is behind the text preceding the formula. Then set the other tabs accordingly. You should never move a tab over another one as it is important to maintain the order of left-justified, right-justified and decimal tabs.

Control characters

Extras-Display-Show all characters

Control characters such as paragraph marks and space marks can be displayed on the screen by clicking on the *Display hidden characters* button. These characters are hidden by clicking again.
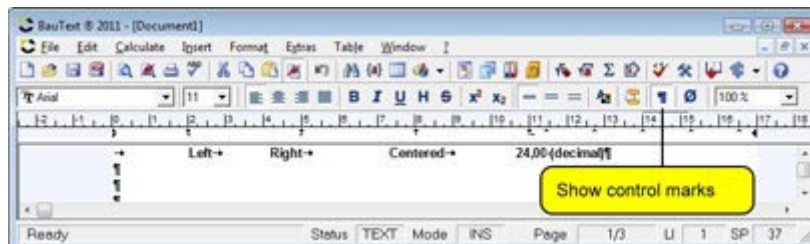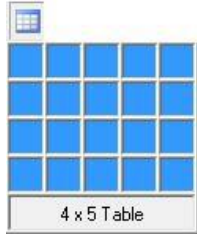
5.3 Inserting tables

**Table-
Insert table**

Basics

It is often easier to arrange numerical and text columns in tables than by using tabs. A table consists of rows and columns. The intersections of each row and column form cells which you can fill with text or images. Within each cell, the text is wrapped in the same way as text in a document is wrapped at the margins of the page.
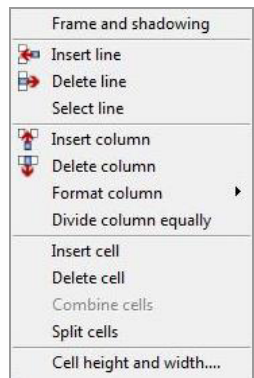
A/2	B/2	B/3	D/2
125,52	152,36	96,78	47,85
246,85	289,63	125,10	56,98
245,23	271,25	186,52	125,89
220,05	225,14	178,96	108,94
837,65	**938,38**	**587,36**	**339,66**

Move frame with mouse

This kind of table can also be used to display text in two parallel paragraphs. In this way you can create a section with several columns or place an image alongside the text (e.g. in headers and footers).

Calculations can be performed if a table is marked as a calculation table. Frames can be set in text with simple tables, e.g.:

Assumed: SCHÜCO-Profil SK 60 V, Nr. 161 850

4 x 5 Table

Frame and shadowing
Insert line
Delete line
Select line
Insert column
Delete column
Format column
Divide column equally
Insert cell
Delete cell
Combine cells
Split cells
Cell height and width....

Editing tables

- **Moving within a table:** You can switch between the cells in a table by using the mouse or TAB or SHIFT+TAB.
- **Selecting:** When selecting the rows of a table with the mouse, it is easier to mark from right to left.
- **Changes within the table:** You can insert or delete rows and columns in the table, change the width of the columns and rows, add borders and shading. The best thing is to use the context menu (right mouse key).

5.4 Special characters, spelling, layout
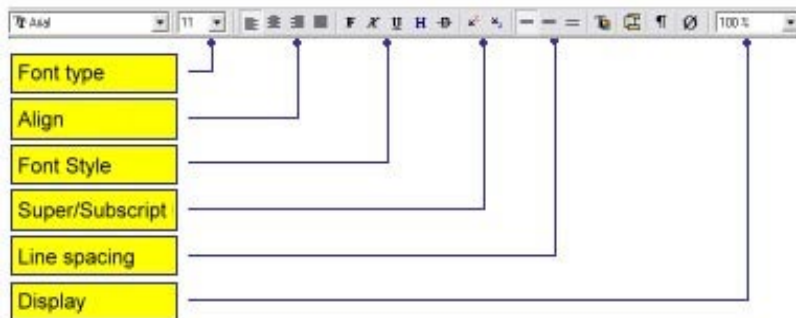
5.4.1 Special characters
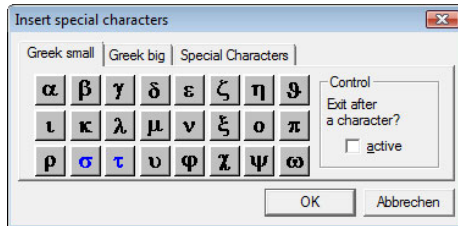
The special characters are set out on three tabs. If you have ticked the active checkbox, the dialog closes as soon as a character is inserted.

F2

**Insert-
Special characters**

5.4.2 Font style and layout

**Format-
Set font-style**

5.4.3 Spelling check

Structural analysis calculations can be checked for spelling mistakes with VCmaster. With standard text programs this is almost impossible as the structural analysis contains technical terms, formula symbols and output data.

Format-Align

In addition to a German and English dictionary, VCmaster includes a technical dictionary with more than 15,000 terms from the building and construction industry. Terms that are not already in the dictionary can be added.

**Extras-
Spelling check**

5.4.4 User interface layout

The settings are made under the item: *Extras – Settings - Program interface*.

Four different menu views are possible. After a change, VCmaster must be closed and started again. The layout view and its colour design are set in the same menu. The layout view can be deactivated. VCmaster then appears in the classic view (see below).
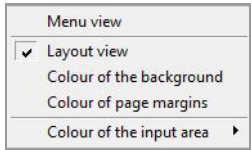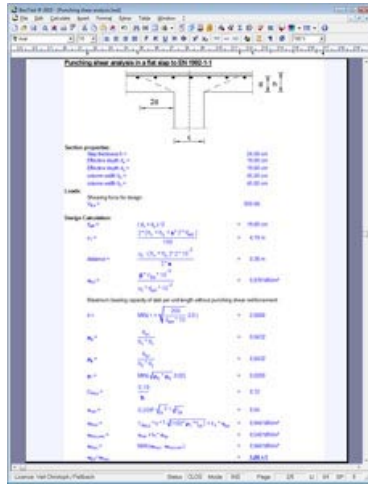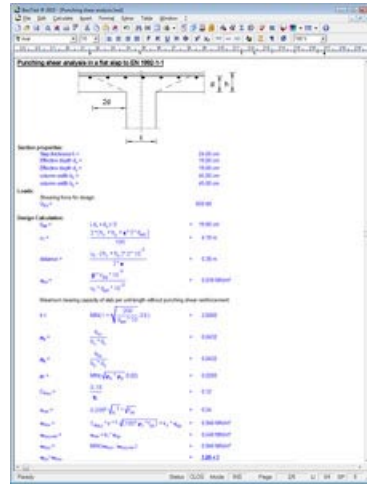
Layout-View   **Classic-View**

5.4.5 Page view

The page view or print preview shows the finished document on the screen. Two modes are offered for this:

- The **standard view:** here the complete document is compiled with Page numbers, Table of contents and all Sub documents.

- The **quick view (right button is activated):** here the current document is shown without updating the fields, such as page numbers and contents directory and without sub documents**.**

The quick view is advisable during editing as this can be called up considerably faster. There is a great difference for large documents in particular. For the final compilation of the documentation (e.g. before PDF export or printing), the option must be deactivated again.
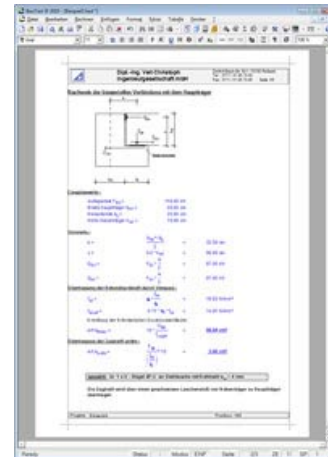
5.5 The most important hotkeys

These shortcut commands speed up input. You can, of course, also use all functions with the mouse.

Help **F1**

Calculate line ....**ALT+ENTER**

Modify calculation line ....**ALT+ENTER**

Graphic formula ....**CTRL+F9**

Variable list **F9**

Add calculation lines **F12**

Indent off/on ....**ALT+POS1**

Cut ....**CTRL+X**

Copy ....**CTRL+C**

Paste ....**CTRL+V**

Copy line ....**CTRL+Z**

Cut line ....**CTRL+Y**

Insert blank line ....**CTRL+K**

Save ....**CTRL+S**

Bold on/off ....**CTRL+B**

Italics on/off ....**CTRL+I**

Underline on/off ....**CTRL+U**

Superscribe on/off ....**CTRL+D**

Subscribe on/off ....**CTRL+E**

Line as Heading ....**CTRL+H**

Line Bold ....**CTRL+Q**

Template Explorer **F10**

Special characters **F2**

Navigator **F6**

Page preview **F8**

Page break on/off ....**CTRL+ENTER**

6. Installation, help and videos

Online help

VCmaster includes an extensive and well-designed help function. This has the advantage of being easier to update than the manual. It also allows you to search for information on a specific question. Notes on using the *Help f*unction.

In contrast to many other software manufacturers, we do not provide our documentation only on electronic media. We think that both media have their advantages and optimally supplement one another. With this in mind, a printed manual has also been designed.

Introductory videos

The use of our software is explained in short animated films (see figure). The films make it easier to approach the program. We strongly recommend first-time users to watch the following videos:

- How does VCmaster calculate?
- How do I load a template?
- Which functions are available for digital technical documentation?
- How does the t2W-Technology work?
- How do I combine loads and results in a table?
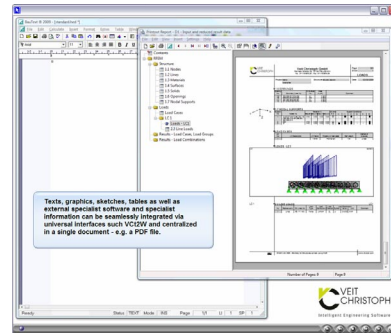
F1

Instructions for using the help

Operation of the help complies with current standards and is straightforward to use. We took particular care in compiling the index. This makes it possible to search for solutions by entering a keyword (Search). Use this option please. The help lists all chapters with information that matches the term you are looking for.
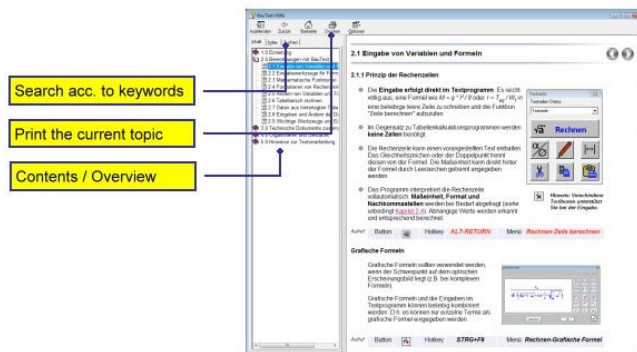
Installation

Installation occurs fully automatically after inserting the CD. If the CD does not start automatically, please select the CD drive in Windows Explorer and start the „*install*" program.

Please read Chapter 4.8. This contains important instructions for organising your work in VCmaster.

You can transfer your settings from another PC under *Extras - Export Settings or Import Settings*.

The release code is required to release the full version. The first two letters of the code stand for the version (e.g. V12 for VCmaster 2012). The matching code is required for the respective program version. This is supplied with the order or with the update. The code and licensee must be entered correctly. The code is independent of the hardware.

System recommendations (status: August 2011)

- Windows 32 Bit: XP, Vista or 7 / Windows 64 Bit: Vista or 7
- Processor greater than 2.0 GHz
- Main memory from 2.0 GB
- Hard disk space: 200-400 MB (depending on the template libraries)
- Monitor from 20'' / at least 1280 x 1024 pixels
- topical information see help

Note on the monitor: It is generally true that a large monitor greatly improves the speed parallel working with several applications. A smaller monitor is sufficient for use of the templates. If you want regularly to create structural analyses, it makes sense to display two A4 pages or VCmaster and a structural analysis program in parallel. This is possible from a monitor size of 24" upwards. Alternatively, two monitors from 20" upwards can also be used. At today's hardware prices, the purchase pays off very quickly as it makes the work considerably more efficient.

Notes on the memory and processor: Notes on the memory and processor: The principle that the size of document that can be processed increases with the performance of the PC applies here. We would like to point out that VCmaster documents, and thus memory requirements, can be quite large. Memory-intensive graphics, in particular, increase the resource requirement in areas that correspond to those of FEM or CAD software. By splitting them up into sub-documents, however, large structural analyses can also be produced on less powerful PCs. Documentation comprising PDF files of up to 1,000 pages can be and regularly is produced in practice.

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