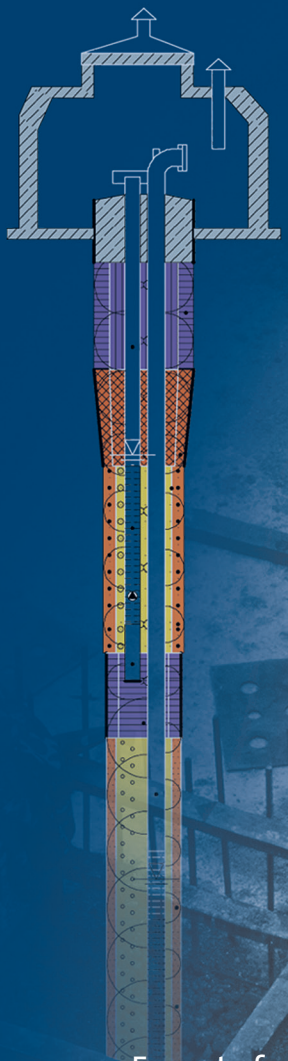
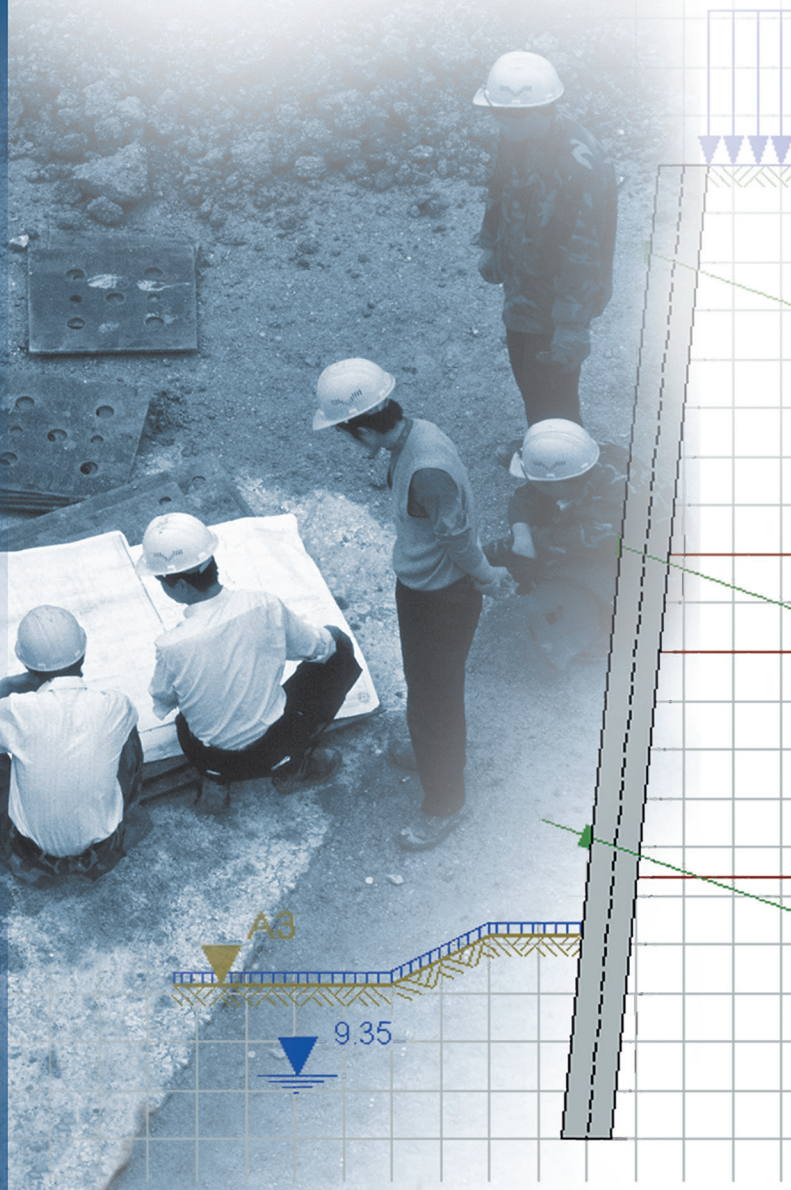
DC-SOFTWARE

The Software for Soil Engineering





Experts for Professionals

Competence in Soil Engineering

Online Service
around the clock

www.dc-softwar
www.grundbausoftware.de
www.grundbaustatik

DC-SOFTWARE

What can you expect from us:

Competence

- Powerful products
- Software from the practice for the practice
- Experience for more than 20 years

Creativity

- Graphic-oriented, with simple operation
- New ways to the integrated foundation engineering
- Short-term realization of customer wishes

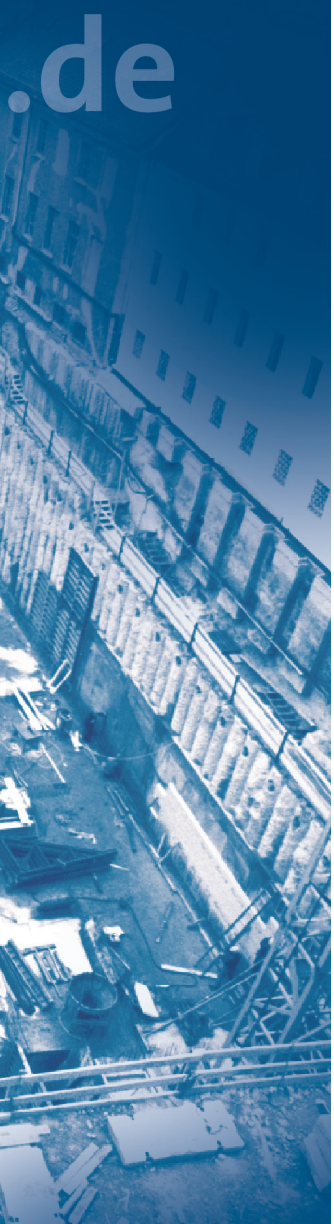
Cost Awareness

- Online service around the clock
- Quick e-mail support
- Competent hotline and consulting
- Economy through permanent development

DC-Software - **the** software for soil engineering

Dr. Eng. Armin Doster

Eng. Axel Christmann



DC-SOFTWARE

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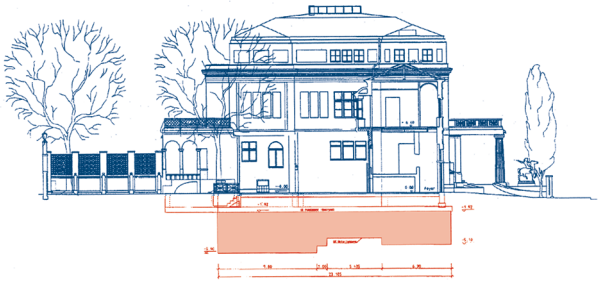

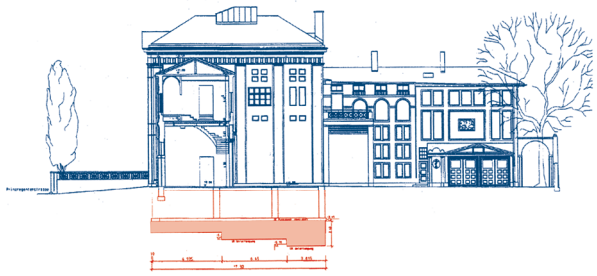

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Powerful software, variable and configurable

Variable software

- Network-compatible programs
- Data and configuration directories selectable
- Header field free to configure
- Integration of a company logo:

Analyzed with DC-Software

Nail wall at the court building in Bolzano

Graphical display

- Filling of soil layers with freely defined colors and symbols with a symbol editor
- Extensive configuration options: line widths, colors, font sizes, font type

Different data formats

- Import of DXF, JPEG, TIFF and BMP
- Export of DXF, JPEG, ASCII
- Saving of data in MS Access format
- Import and export of SEP format

Internationally applicable

- Multilingual: user interface and output language to be selected differently, e.g. English user interface and German result output; French, Italian, Spanish, Portuguese, Bulgarian, Romanian, Hungarian, Russian, Bosnian language available
- Support of different standards: Eurocode, DIN, OENORM, SIA, British Standard, Indian IS

DC-Software in practice

Analyzed with DC-Software

Sheet pile walls at the Brenner base tunnel (Brixlegg)

Analyzed with DC-Software

Sheet pile walls at the Lenbach gardens in Munich

Analyzed with DC-Software

Bore pile and nail walls at the Brenner base tunnel (Brixlegg)

Analyzed with DC-Software

Multi-step nail wall in Bolzano

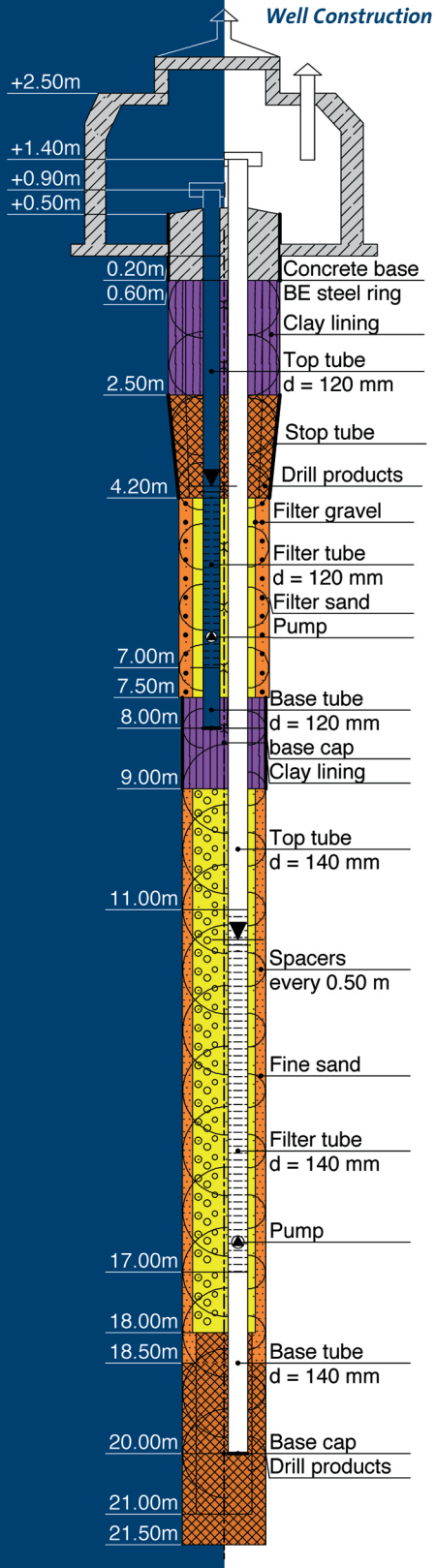
Access over Internet

- Download center for updates around the clock
- Download of demo versions over www.dc-software.com
- Simple orders in the web shop over www.dc-software.com

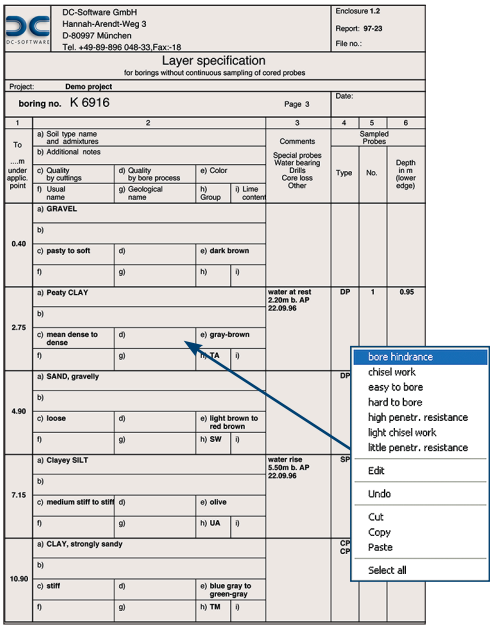
DC-SOFTWARE

Bore hole logs, Layer specifications
Well and gauge sinking
DCBORE

Well Construction



- Bore profiles acc. to DIN 4023:2006, DIN EN ISO 14688-1, OENORM B 4400-1, SN 640 034 and 670 008, British Standard BS 5930
- Layer specification acc. to DIN EN 22 475-1, DIN 4022 and DIN 4943
- Well and piezometer display acc. to DIN 4943
- German, English, French, Romanian language
- **Geothermal borings** with sounding cone and colored pipes

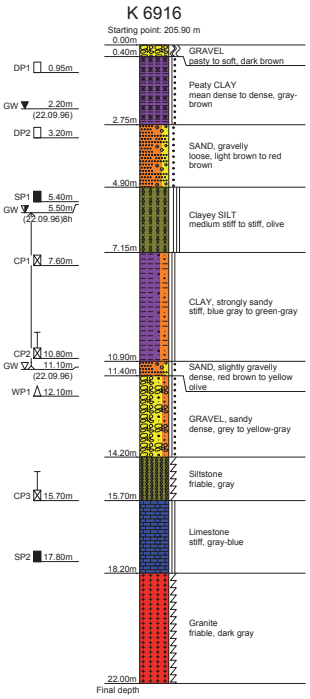


Layer specification

Functions

Bore hole logs:

- Layer input through short designations, immediate conversion into long text
- Free completion of the layer descriptions
- Samples and water levels (different types), soil group and soil class



Bore profile

- Complete symbol editor to define and modify all soil types, abbreviations and colors
- Layer specification: user-defined selection of font and font style (bold, italic), predefined texts with right mouse button

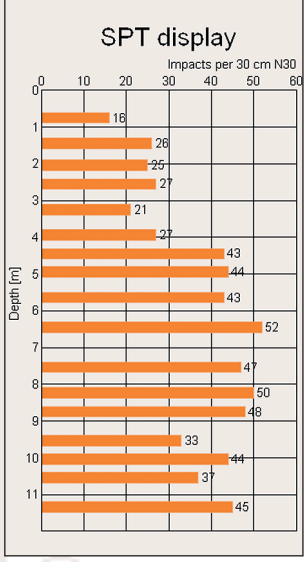
Level and well finish:

- Detailed graphic of level-head and/or well pit
- Any number of pipes (multi-level)
- All kinds of pipe types (extension pipe, different types of filter pipes, sump pipe, gauge pipe) incl. haunches
- User-defined fillings with symbol editor, any number of multi-fillings (counter filter), with block pipe or continuous sealing
- Spacers: different types

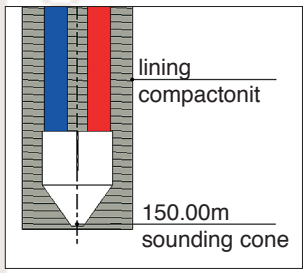
- Infill baskets, infill pipes, cementation items, packers
- Automatic labeling, optionally user-defined labeling

Operation

- Immediate graphical control of all input with zoom-function
- Most simple edit process by double-click in the graphic
- Extensive configuration options: abbreviations, long text, color, consistency, soil group, soil class, samples/water levels on/off, elevations etc.
- All kinds of page formats up to A0, customizable definition of the title block



Standard penetration test acc. to EN ISO 22 476-3 and DIN 4094-2



Display of geothermal boring

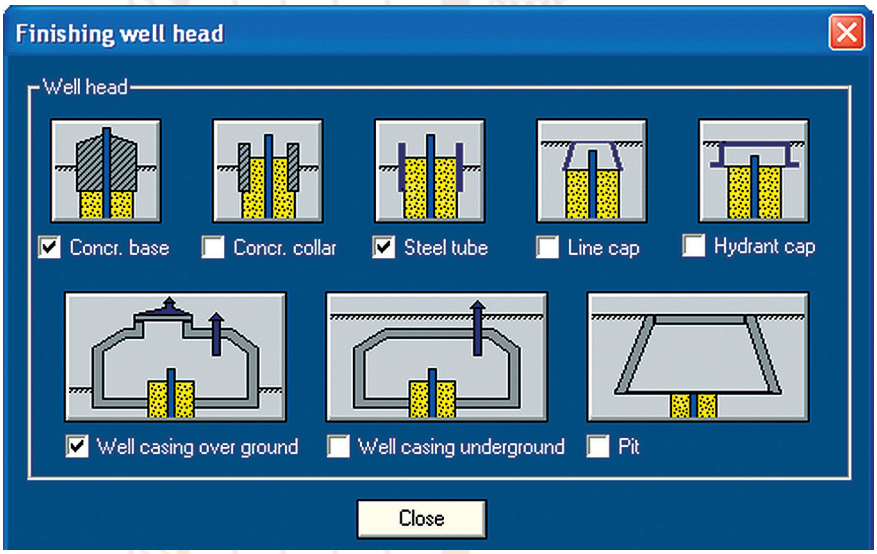
K 6912
Heat extraction

acc. to guideline VDI 4640
for 1800 annual operation hours, water level = 19.85 m

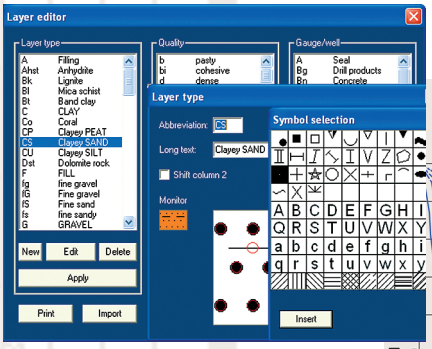
No.	Soil type	Layer name	Thickness [m]	Spec. heat extraction[W/m]	Heat extraction[W]
1		Clayey PEAT	0.40	25.0	10.0
2		GRAVEL	2.35	25.0	58.8
3		Sandy SILT	11.80	35.0	406.0
4		Silty CLAY	4.15	35.0	145.3
5		Silty SAND	4.95	25.0 / 65.0 *	267.8
6		GRAVEL	7.75	65.0	503.8
7		SAND	8.35	65.0	542.8
8		GRAVEL	8.75	65.0	568.8
9		SAND	13.70	65.0	890.5
Total			**62.00**		**3393.5**

* values above / below ground water

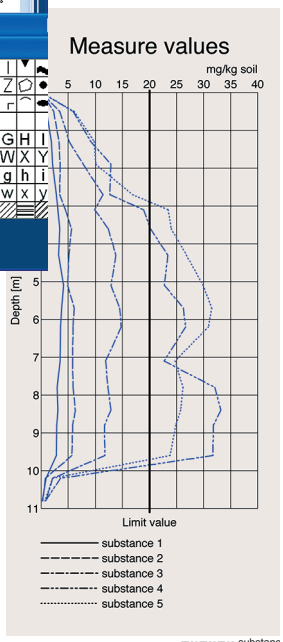
Determination of the heat extraction with DCBORE-Geotherm



Level and well heads



Extensive symbol editor



DCBORE Data logger

- Project-related database storage: access via Microsoft Access possible
- Graphics export to DXF format (AutoCAD)

Additional options

- DCBORE-Geotherm: Determination of the heat extraction acc. to VDI guideline 4640 directly from the bore profile
- DCSTAN: BDPs (SPT: Standard Penetration Test acc. to DIN 4094-2, EN ISO 22476-3)
- DCBORE-Data logger: measure values in a diagram along with the bore profile: lines/bars, linear/logarithmic
- DCBORE-LS2: Layer specification according to DIN 4022 Part 2 (borings in rock)
- DCBORE-LS3: Layer specification according to DIN 4022 Part 3 (taking cored samples)
- DCBORE-SEP: Import and export of bore data in SEP format
- DCBORE-ProfilTec: Import from GeoLogik ProfilTec Feldbuch

DC-SOFTWARE

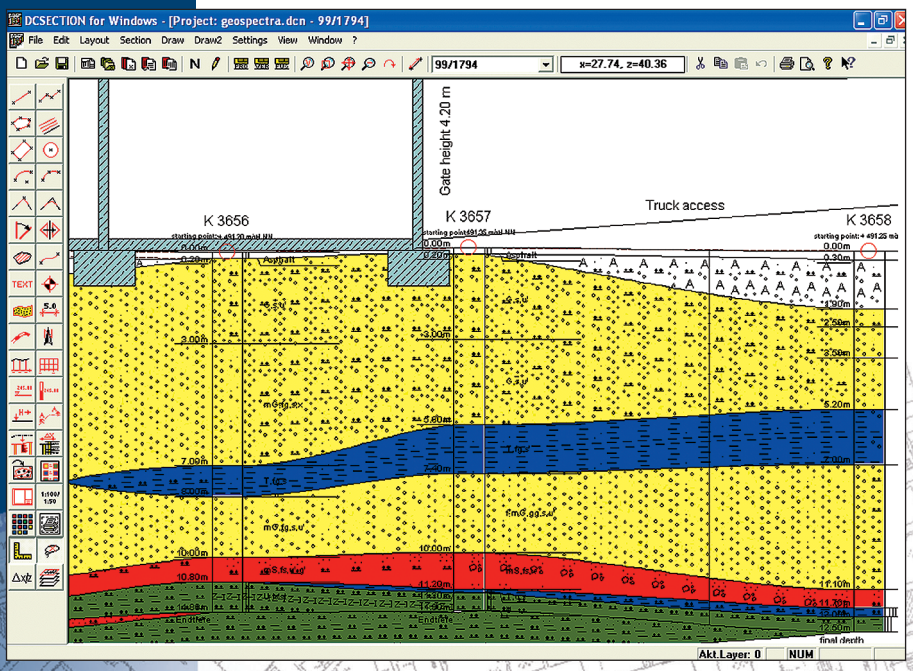
Geological sections and drill-point plans
DCSECTION

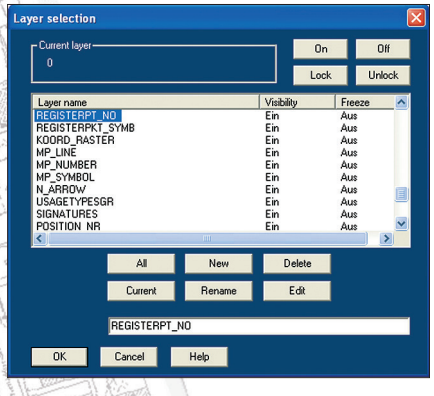
- Display of the soil layers acc. to DIN 4023:2006, OENORM B 4400-1, SN 640 034, British Standard BS 5930
- German, English, French, Romanian language

Site map function

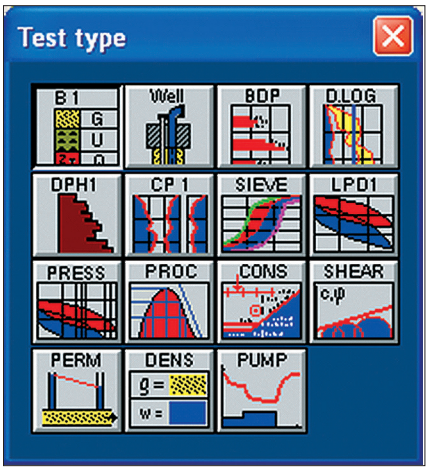
- Creation of site maps (drill-point plans)
- Import from CAD through DXF or scanned plans through bitmaps, export of plans in DXF and JPEG format
- Support of blocks in DXF
- Complete layer management with switch on/off and freeze
- Edit with extensive CAD functions: lines, texts, polygons, intersection, symbols, dimension strings
- Optional graphical input with/without grid, snap and ruler tools or with the keyboard
- Customizable colors, line types, line widths, etc.
- Insert profiles, dynamic probe diagrams, etc. as symbols

Section graphic





Layer management

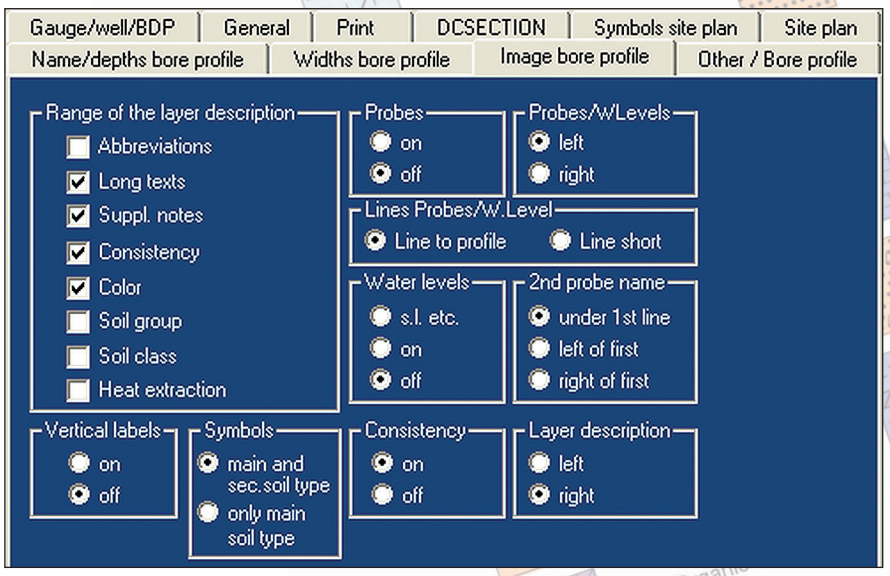


Selection of tests to be inserted

- Automatic, correct arrangement with coordinate values
- Draw sections as arbitrary polylines
- Auto-Section to create automatically a horizontal section with correct arrangement of positions and heights

Horizontal sections

- Access to single tests of DCBORE, DCPROBE, etc.
- Data display from a database: each modification is immediately displayed in the plan
- Complete configuration of the test graphic with plan-related storage
- Automatic arrangement by height according to point of application
- Filling of layer areas of any shape: limitation by straight lines or curves (splines), filling with layer symbols and colors



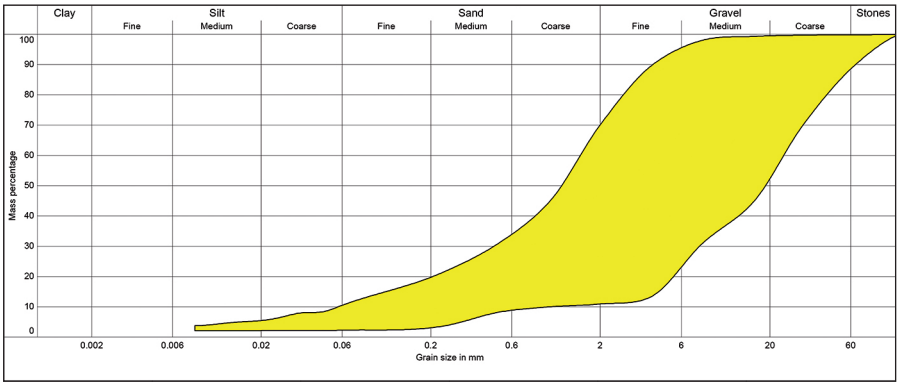
Extensive configuration

- Integration of images through bitmaps, e.g. photographs
- Inserting plans into another plan: e.g. small site map into a horizontal section
- Additional functions like elevations, symbols, setting kilometers, scale, railway line
- Automatic legend of all soil types
- Plan formats from A4 to A0 and customizable formats
- Hardcopy tool for quick output of overviews and excerpts on A4

- Low-price DCSECTION basic version (without site map function, Auto-Section and additional functions)

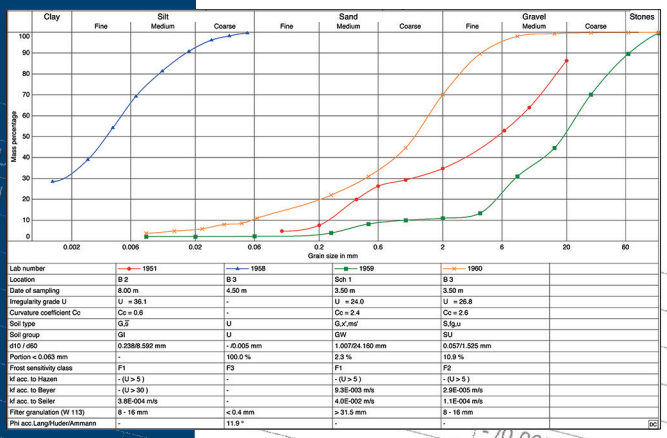
DC-SOFTWARE

Sieve and sedimentation analysis
DCSIEVE



Graphic as envelope

- Sieve and sedimentation analysis acc. to DIN 18 123-5 to 7, EN ISO/TS 17892-4, OENORM B 4412, SN 670 810c, 670 816a, 670 008a, 670 140b, 670 120d
- German, English, French, Romanian language
- Use of any sieve sets
- Sedimentation with different areo-meters
- Any number of sieve lines on a page
- Optional graphic as envelope
- Limit lines and points according to ZTVT, ETV, DIN 4226, DIN 18035, TL-Min, ZTV SoB, TL SoB, TV-VEG, FLL, BMVBW ARS, DBS 918 061/062, SN 670 120d, SN 670 130, SN 670 119
- Determination of the sediment coefficients: Kurtosis, inclination, sorting etc.
- Detailed evaluations:
  - Irregularity grade U_C
  - Curvature coefficient C_C
  - Angle of internal friction acc. to Lang/Huder/Amann
  - Soil type, optionally with fine subdivision
  - Soil group according to DIN 18 196 / USCS
  - Frost sensitivity class
  - Permeability according to van Hazen, Beyer, Seiler, Kaubisch
  - Portion < 0,063 mm
  - d_{10} / d_{60}
  - Portions to free grain sizes
  - Grain sizes to free percent values
  - Filter granulation according to DVGW W113 and Bieske
  - Customizable label fields
  - Addition DCSIEVE-ZTVE: Frost-proof analysis according to ZTVE-StB 09 and ZTVT-StB 95



Lab number	1951	1958	1959	1960
Location	B 2	B 3	Sch 1	B 3
Date of sampling	8.00 m	4.50 m	3.50 m	3.50 m
Irregularity grade U	U = 36.1	-	U = 24.0	U = 26.8
Curvature coefficient Cc	Cc = 0.6	-	Cc = 2.4	Cc = 2.6
Soil type	G,fs	U	G,s',ms'	S,fg,u
Soil group	GI	U	GW	SU
d10 / d60	0.238/8.592 mm	- /0.005 mm	1.007/24.160 mm	0.057/1.525 mm
Portion < 0.063 mm	-	100.0 %	2.3 %	10.9 %
Frost sensitivity class	F1	F3	F1	F2
kf acc. to Hazen	- (U > 5)	-	- (U > 5)	- (U > 5)
kf acc. to Beyer	- (U > 30)	-	9.3E-003 m/s	2.9E-005 m/s
kf acc. to Seiler	3.8E-004 m/s	-	4.0E-002 m/s	1.1E-004 m/s
Filter granulation (W 113)	8 - 16 mm	< 0.4 mm	> 31.5 mm	8 - 16 mm
Phi acc.Lang/Huder/Ammann	-	11.9 °	-	-

Several sieve lines per page with evaluation

Analysis according to ZTVE/ZTVT

Soil group acc. to USCS / ZTVE-StB 09: GI Gravel, intermediately graded
Frost sensivity class acc. to ZTVE-StB 09: F1 (not frost sensitive)

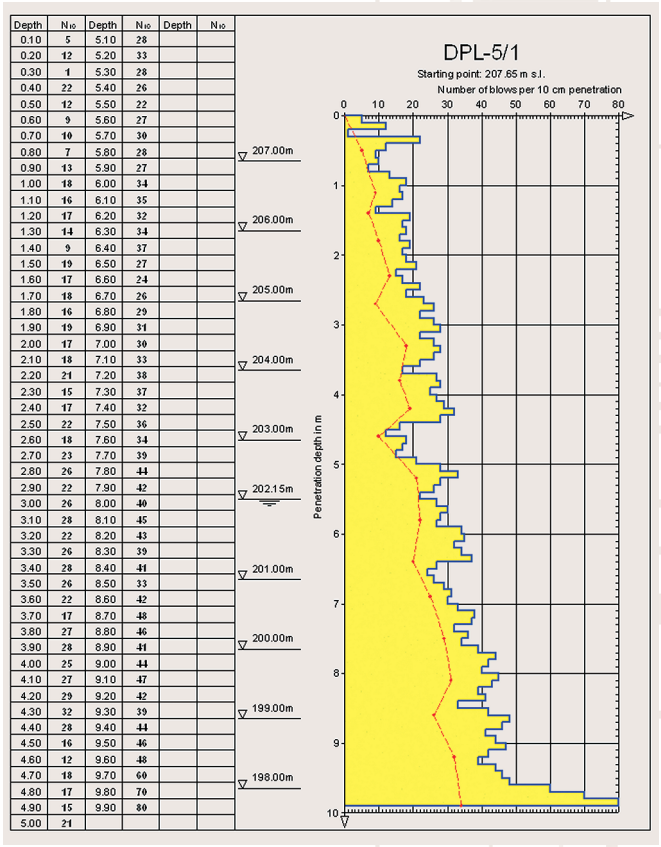
Requirements to the anti-freeze layer acc. to ZTVT-StB 09
a) Frost sensitivity

	Sieve passing available	perm. portion	Requirement fulfilled
Portion <= 0.063 mm in m.-%	2.6%	<= 5.0%	yes

Judgement:
The requirements to the anti-freeze layer acc. to ZTVE-StB 09 are fulfilled.

Dynamic probing tests
DCPROBE

- Dynamic probing tests acc. to EN ISO 22 476-2, DIN 4094-3, SN 670 417
- German, English, French, Romanian language
- Blow counts input – single or as a sum
- Sounding as a line, bars or filled bars, optionally with labeling
- Optional display of a table with blow counts
- Graphic of the skin friction, two lines possible (e.g. for arbitrary additional lines)
- Determination and display of the dynamic resistance
- Labels of the height of application and elevations
- Setting minimal and maximum diagram size
- ASCII and DXF interface, import from Geotool available

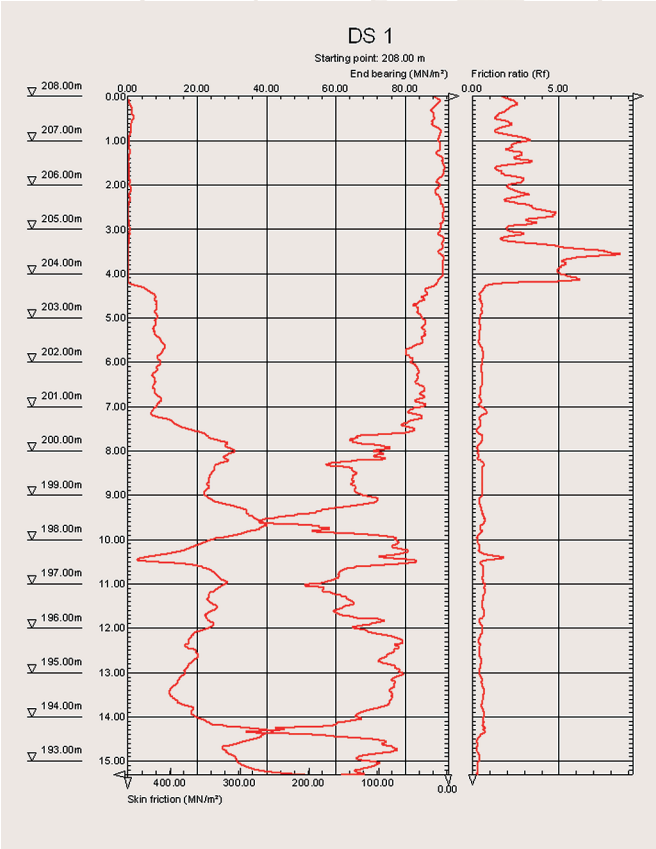


Depth	N10	Depth	N10	Depth	N10
0.10	5	5.10	28		
0.20	12	5.20	33		
0.30	1	5.30	28		
0.40	22	5.40	26		
0.50	12	5.50	22		
0.60	9	5.60	27		
0.70	10	5.70	30		
0.80	7	5.80	28		
0.90	13	5.90	27		
1.00	18	6.00	34		
1.10	16	6.10	35		
1.20	17	6.20	32		
1.30	14	6.30	34		
1.40	9	6.40	37		
1.50	19	6.50	27		
1.60	17	6.60	24		
1.70	18	6.70	26		
1.80	16	6.80	29		
1.90	19	6.90	31		
2.00	17	7.00	30		
2.10	18	7.10	33		
2.20	21	7.20	38		
2.30	15	7.30	37		
2.40	17	7.40	32		
2.50	22	7.50	36		
2.60	18	7.60	34		
2.70	23	7.70	39		
2.80	26	7.80	44		
2.90	22	7.90	42		
3.00	26	8.00	40		
3.10	28	8.10	45		
3.20	22	8.20	43		
3.30	26	8.30	39		
3.40	28	8.40	41		
3.50	26	8.50	33		
3.60	22	8.60	42		
3.70	17	8.70	48		
3.80	27	8.80	46		
3.90	28	8.90	41		
4.00	25	9.00	44		
4.10	27	9.10	47		
4.20	29	9.20	42		
4.30	32	9.30	39		
4.40	28	9.40	44		
4.50	16	9.50	46		
4.60	12	9.60	48		
4.70	18	9.70	60		
4.80	17	9.80	70		
4.90	15	9.90	80		
5.00	21				

Graphic with table of blow counts

Cone penetration tests
DCCONE

- Cone penetration tests acc. to EN ISO 22 476-1, DIN 4094-1
- German, English, French, Romanian language
- Diagrams for end bearing, skin friction and friction ratio
- All diagrams are customizable, with free labels
- ASCII interface to import measure data available



Cone penetration test with 3 diagrams

DC-SOFTWARE

Load plate pressure test
DCLOAD

Soil pressure in MN/m²	Settlement s in 0.01 mm	Soil pressure in MN/m²	Settlement s in 0.01 mm	Soil pressure in MN/m²	Settlement s in 0.01 mm
0.080	7	0.250	113	0.080	81
0.160	20	0.120	95	0.160	88
0.240	31	0.000	75	0.240	97
0.320	53			0.320	104
0.400	80			0.400	115
0.450	96			0.450	123
0.500	128				

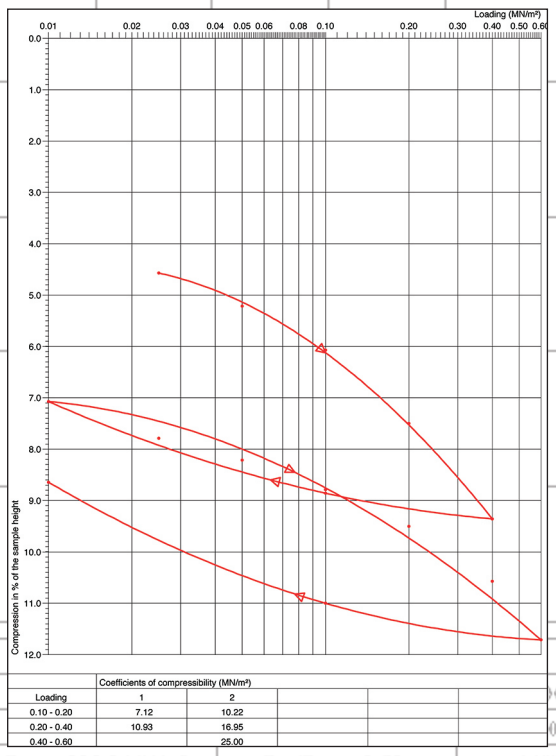
- Load plate pressure test acc. to DIN 18 134, SN 670 317b, BS 1377-9
- German, English, French language
- Optional determination of deformation modulus E_V or modulus of foundation k_S
- Evaluation of E_{v1} , E_{v2} , E_{v3}, E_{v2}/E_{v1}, comparison with obligatory values
- Input of measurement with 1 or 3 gauges
- Loading as force / manometer reading or soil pressure, settlement in mm or 1/100 mm
- Optional display with measure values
- Adjustable minimal range for the diagram

Presentation of the measure values

Evaluation

Max. Sigma$_1$	Curve	Parameter a$_1$	Parameter a$_2$	E$_v$	Plate d = 300 mm
0.500	1	-0.26	5.18	E_{v1}= 96.8 MN/m²	$\frac{E_{v2}}{E_{v1}}$ = 2.13
0.500	2	0.66	0.87	E_{v2}= 206.3 MN/m²	
Requirement:		E_{v2}>= 200.0 MN/m²	E_{v2}/E_{v1}<= 2.50	fulfilled: yes	

Compression test
DCPRESS



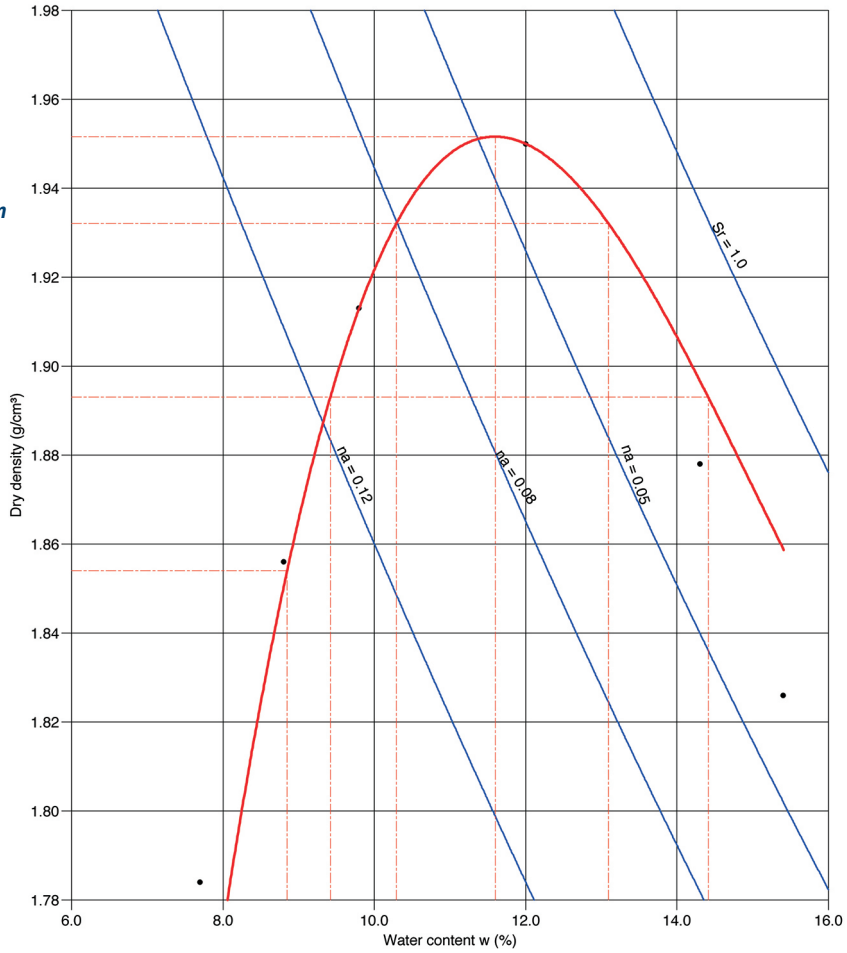
Pressure-Settlement-Line

- Oedometer test acc. to EN ISO/TS 17892-5
- German, English, French language
- Input of force or soil pressure, settlement in mm or 1/100 mm
- Logarithmic presentation
- Evaluation of arbitrary load areas for the modulus of compressibility
- Optional presentation with measure values
- Adjustable minimal range for the diagram

Proctor test
DCPROC

- Proctor test acc. to DIN 18 127, SN 670 330b
- German, English, French language
- Variable number of measurements
- Optional input through trim height measurements
- Simple or corrected proctor test
- Evaluation of proctor density and optimum water content
- Evaluation with any percent values: w_{min}, w_{max}
- Graphic of the line of saturation, additionally with customizable n_a lines
- Optional presentation of the measure values
- Water contents in % or decimal
- Any number of tests per page to get an overview

Graphic with line of saturation and n_a lines



		100 %		99.0 %	97.0 %	95.0 %
Proctor density	:	1.952 g/cm³	Density (g/cm³)	1.932	1.893	1.854
Optimal water content	:	11.60 %	wmin (%)	10.29	9.42	8.85
Natural water content	:	20.00 %	wmax (%)	13.09	14.41	

Evaluation

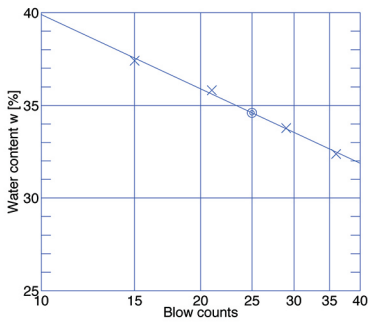
Definition of the humid density							
Measurement no.		1	2	3	4	5	6
Humid probe+cylinder	(g)	14619	14837	15014	15200	15117	15030
Mass cylinder	(g)	10375	10375	10375	10375	10375	10375
Mass humid probe	(g)	4244	4462	4639	4825	4742	4655
Probe volume	(cm³)	2209	2209	2209	2209	2209	2209
Humid density	(g/cm³)	1.921	2.020	2.100	2.184	2.147	2.107
Definition of the water content							
Humid probe+container	(g)	5394.0	5562.0	5719.0	6175.0	5942.0	5755.0
Dry probe + container	(g)	5091.0	5201.0	5305.0	5658.0	5349.0	5134.0
Mass container	(g)	1150.0	1100.0	1080.0	1350.0	1200.0	1100.0
Mass pore water	(g)	303.0	361.0	414.0	517.0	593.0	621.0
Mass dry probe m	(g)	3941.0	4101.0	4225.0	4308.0	4149.0	4034.0
Water content w	(%)	7.7	8.8	9.8	12.0	14.3	15.4
Dry density γ_d	(g/cm³)	1.784	1.856	1.913	1.950	1.878	1.826

Presentation of the measure values

DC-SOFTWARE

Consistency limits
DCCONS

		Liquid limit					Plastic limit				
Container no.		1	2	3	4		1	2	3	4	
Blow counts		36	29	21	15						
Moisture probe + Container	$m_f + m_B$ [g]	58.82	43.95	49.60	45.41		45.32	63.98	43.23	45.45	
Dry probe + Container	$m_t + m_B$ [g]	56.44	41.34	47.24	42.90		44.44	63.11	42.64	45.29	
Container	m_B [g]	49.09	33.61	40.65	36.19		40.25	58.44	38.30	40.26	
Water	$m_f - m_t = m_w$ [g]	2.38	2.61	2.36	2.51		0.88	0.87	0.59	0.16	
Dry probe	m_t [g]	7.35	7.73	6.59	6.71		4.19	4.67	4.34	5.03	Mean
Water content $\frac{m_w}{m_t} = w$	[%]	32.4	33.8	35.8	37.4		21.0	18.6	13.6	3.2	14.1



Water content w_N = 22.6 %
Liquid limit w_L = 34.6 %
Plastic limit w_P = 14.1 %

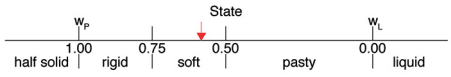
Plasticity range (w_L to w_P)

0 10 20 30 40 50 60 70 80 [%]

Plasticity number $I_P = w_L - w_P$ = 20.5 %

Liquidity index $I_L = \frac{w_N - w_P}{I_P}$ = 0.415

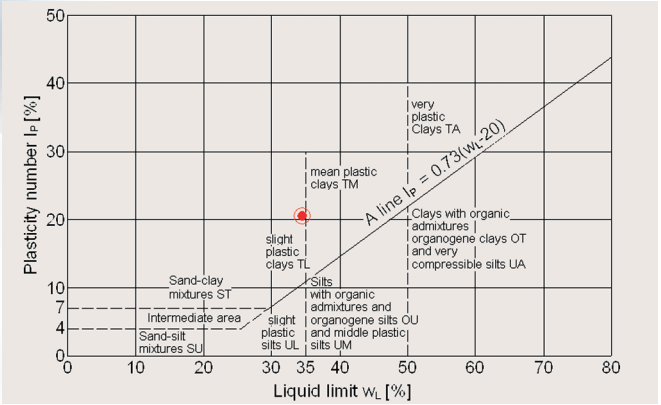
Consistency no. $I_C = \frac{w_L - w_N}{I_P}$ = 0.585



Detailed evaluations

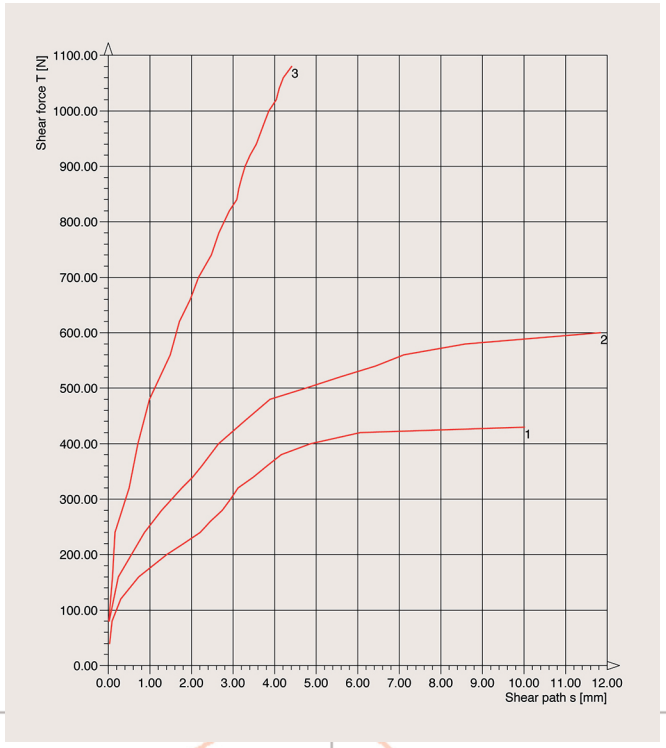
- Atterberg's consistency limits acc. to DIN 18 122, EN ISO/TS 17892-12, OENORM B 4411, SN 670 345a
- German, English, French, Romanian language
- Determination of liquid and plastic limits
- Plasticity range and state form
- Plasticity index I_P and consistency index I_C
- Optional single-point or multi-point approach
- Consideration of the oversize grain
- Water content, oversize grain and evaluation optionally in % or decimal
- Arrangement in the soil group according to DIN 18 196 / USCS
- Optional predefinition of correction factors

Soil group according to DIN 18 196 / USCS

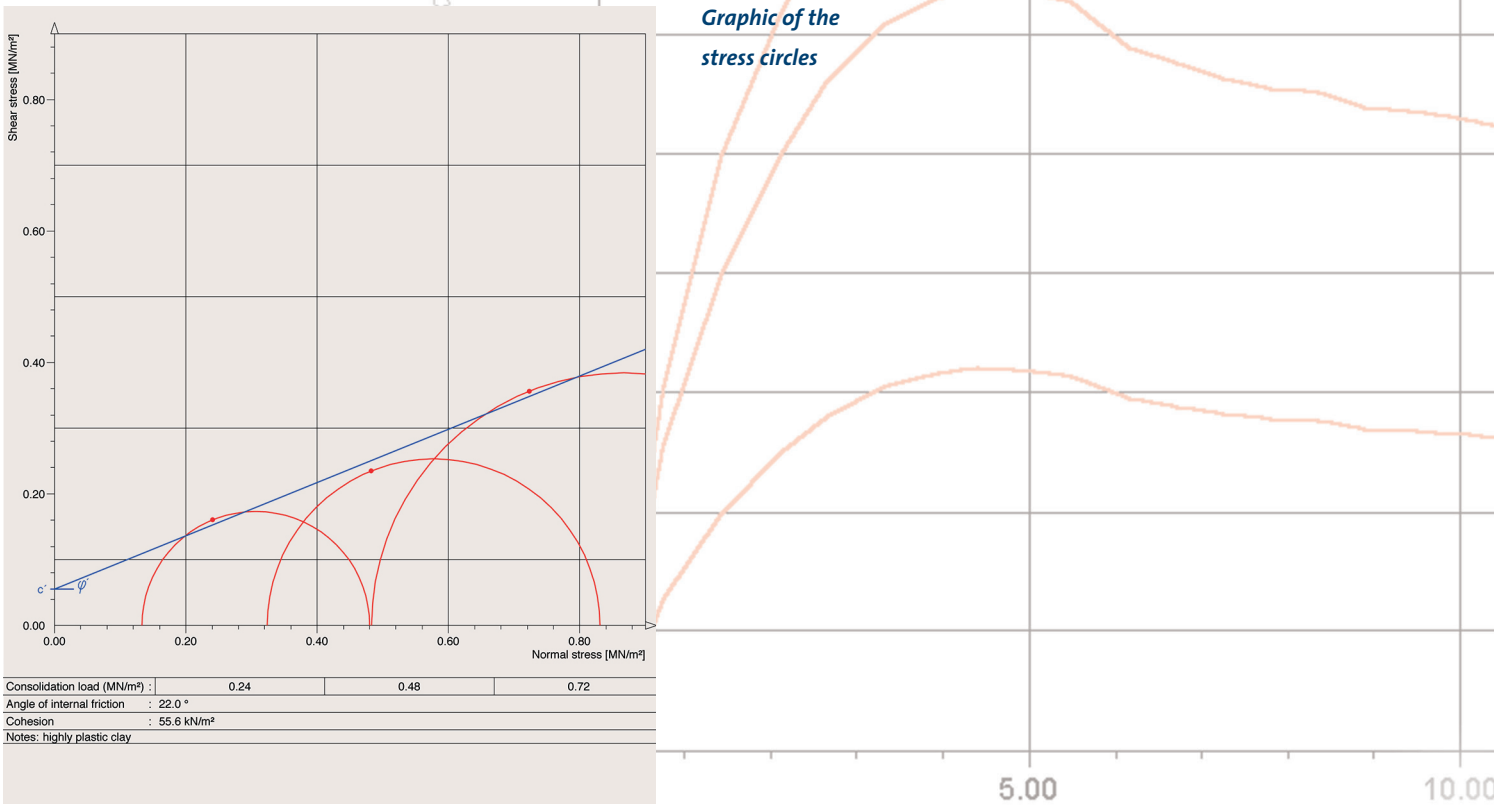


Shear strength test
DCSHEAR

- Shear strength test acc. to DIN 18 137, EN ISO/TS 17892-10
- German, English, French, Romanian language
- Square or circular sample shape
- Loading in kg or kN, shear course in mm or 1/100 mm
- Evaluation of friction angle and/ or cohesion
- Graphic of the shear circles or of the shearing path and the vertical deformation
- Adjustable units of the graphic
- **Addition DCSHEAR-3D:** Triaxial test according to DIN 18 137 Part 2 (D, CU, CCV or UU test)



Graphic of the shear course



Consolidation load (MN/m²) :	0.24	0.48	0.72
Angle of internal friction	: 22.0 °		
Cohesion	: 55.6 kN/m²		
Notes: highly plastic clay			

Graphic of the stress circles

DC-SOFTWARE

Density
Water content
DCDENS

- Density acc. to DIN 18 125, EN ISO/TS 17892-2
- Water content acc. to DIN 18 121, EN ISO/TS 17892-1, SN 670 340b
- German, English, French language
- Printout for density and water content together or separately
- Water content with 2 or 4 measures
- Optionally with comparison to the degree of compaction from the proctor test

Bowl no. 1	Bowl and sample moist [g]	= 453.70 g	Bowl and sample dry [g]	= 446.18 g
	Bowl and sample dry [g]	= 446.18 g	Bowl weight [g]	= 190.40 g
	Water content [g]	= 7.52 g	Dry sample G [g]	= 255.78 g
			Water content [%]	= 2.94 %
Bowl no. 2	Bowl and sample moist [g]	= 445.70 g	Bowl and sample dry [g]	= 437.48 g
	Bowl and sample dry [g]	= 437.48 g	Bowl weight [g]	= 182.55 g
	Water content [g]	= 8.22 g	Dry sample G [g]	= 254.93 g
			Water content [%]	= 3.22 %
			Average	= 3.08 %

Water content

Density	Natural water content w_n [%]	3.08
	Density of moist soil [g/cm³]	1.614
	Density of dry soil [g/cm³]	1.566
Compaction	100% Proctor density	2.010
	min/max water content	15.20 / 18.40
	req. degree of compaction	95.0
	obt. degree of compaction	77.9
Coefficients	Granular density γ_s	2.670
	1-n	0.59
	Pore content n	0.41
	Pore ratio ε	0.71
	Saturation ratio S_r	0.12

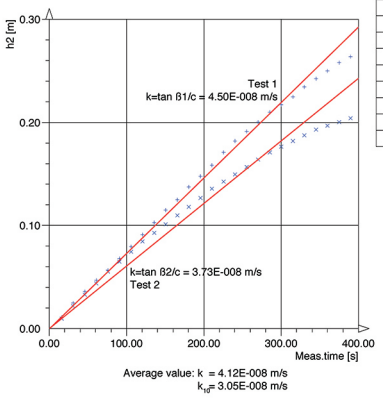
Density and coefficients

Permeability test
DCPERM

Analysis of mixed-grained soils acc. DIN 18130 - KD - ES - ST - SB

Test results:		Versuch 1	Versuch 2
Diameter of the sample d	[cm]	10.00	10.00
Cross-section of the sample A	[cm²]	78.54	78.54
Standpipe cross-section a	[cm²]	0.243	0.243
Temperature T	[Grad C]	22.00	22.00
Hydraulic gradient I		27.0	27.0
Length of sample l	[m]	0.0199	0.0199
Density of the sample:	ϱ [g/cm³]	2.170	2.200
	ϱ_d [g/cm³]	1.900	1.920
	ϱ_s [g/cm³]	2.700	2.700
	n [%]	29.80	28.90
	e	0.424	0.406
Water content: before the test w (%)		14.40	14.60
after the test w (%)		15.60	15.00
Water column h_1	[m]	0.655	0.655

Meas.time	Test 1		Test 2	
t [s]	h2 [m]	$\ln \frac{h1}{h2}$	h2 [m]	$\ln \frac{h1}{h2}$
15	0.65	0.0107	0.65	0.0092
30	0.64	0.0247	0.64	0.0216
45	0.63	0.0357	0.63	0.0326
60	0.63	0.0469	0.63	0.0437
75	0.62	0.0565	0.62	0.0549
90	0.61	0.0679	0.61	0.0646
105	0.61	0.0794	0.61	0.0745
120	0.60	0.0910	0.60	0.0844
135	0.59	0.1028	0.60	0.0927
150	0.58	0.1147	0.59	0.1011
165	0.58	0.1251	0.59	0.1096
180	0.57	0.1372	0.58	0.1182
195	0.57	0.1478	0.58	0.1268
210	0.56	0.1585	0.57	0.1355
225	0.55	0.1711	0.57	0.1425
240	0.55	0.1820	0.56	0.1496
255	0.54	0.1912	0.56	0.1567
270	0.54	0.2005	0.56	0.1639
285	0.53	0.2099	0.55	0.1711
300	0.53	0.2174	0.55	0.1765
315	0.52	0.2251	0.55	0.1820
330	0.52	0.2347	0.54	0.1875
345	0.51	0.2424	0.54	0.1931
360	0.51	0.2502	0.54	0.1968
375	0.51	0.2581	0.54	0.2005
390	0.50	0.2640	0.53	0.2042



Evaluation with balancing straight line

- Permeability test acc. to DIN 18 130, EN ISO/TS 17892-11
- German, English, French language

5 types of tests according to DIN 18 130:

- mixed-grained soils according to DIN 18 130 - KD - ES - ST - SB
- coarse-grained soils according to DIN 18 130 - ZY - MS - MZ
- mixed-grained soils according to DIN 18 130 - TX - DE - MZ - SB
- fine-grained soils according to DIN 18 130 - TX - DE - KP - UO
- coarse-grained soils according to DIN 18 130 - ZY - ES - ST

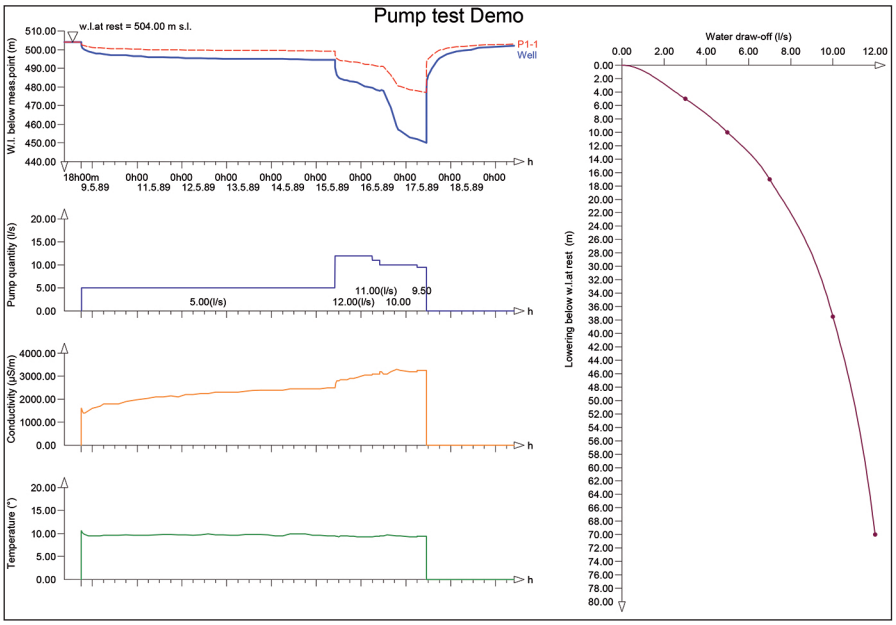
3 types acc. to EN ISO/TS 17892-11:

- Falling hydraulic head
- Constant hydraulic head
- Triaxial cell

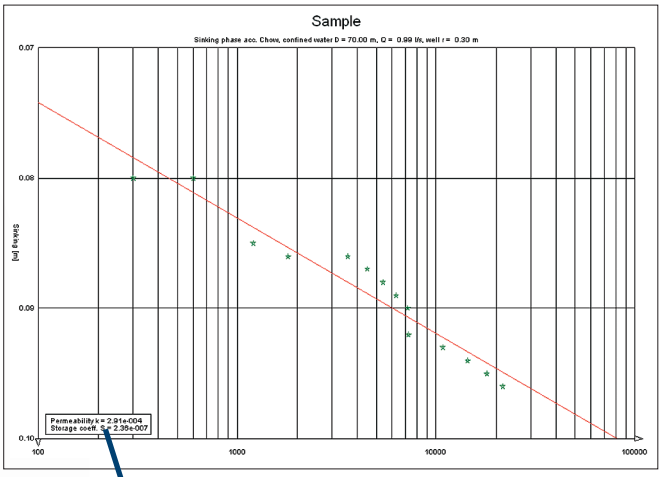
- Customizable number of measurements
- Output of all test data in a table

Pump test graphic and evaluation
DCPUMP

- German, English, French language
- Curve of sinking in the well
- up to 9 pertaining gauge levels in the diagram
- up to 9 customizable diagrams below (pumping capacity, conductivity, temperature, pH-value, ...)
- Optionally with capacity diagram
- Listing of all measure values
- Data logger as an addition for the import of measure data: Hydrotechnik, Ott, Seba, Aquitronic, CSM, ASCII or MS Excel with filter function



Pump test graphic



Permeability k = 2.91e-004
Storage coeff. S = 2.36e-007

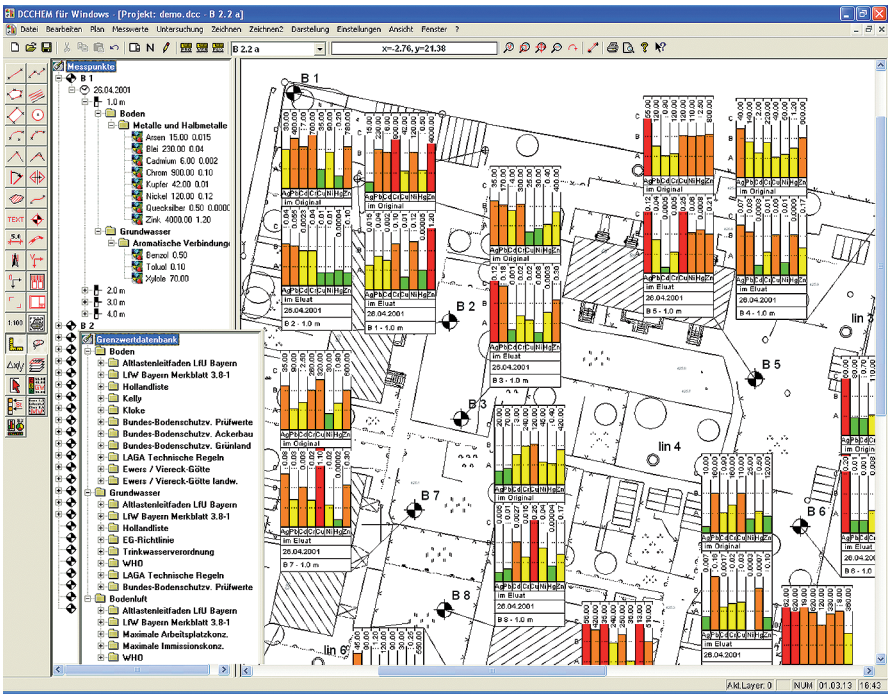
Pump test evaluation

Option
DCPUMP-Evaluation

- Unconfined or confined aquifer
- Evaluation of the curve of sinking according to Chow/Jakob
- Evaluation of the re-rising according to Theis
- Evaluation of a stationary state according to Thiem (well - gauge level)
- Simple switching of points on/off
- Customizable ranges of measure values
- Determination of the permeability (k) or transmissivity (S)

DC-SOFTWARE

Display of old load survey
DCCHEM



Comparison of the measure values with the limit values

Untersuchung von Boden: Metalle und Halbmetalle im Original

					(LfW)
Arsen	(As)	in mg/kg	- 10.00	- 50.00	> 50.00
Blei	(Pb)	in mg/kg	- 100.00	- 500.00	> 500.00
Cadmium	(Cd)	in mg/kg	- 10.00	- 50.00	> 50.00
Chrom	(Cr)	in mg/kg	- 50.00	- 1000.00	> 1000.00
Kupfer	(Cu)	in mg/kg	- 100.00	- 500.00	> 500.00
Nickel	(Ni)	in mg/kg	- 100.00	- 500.00	> 500.00
Quecksilber	(Hg)	in mg/kg	- 2.00	- 10.00	> 10.00
Zink	(Zn)	in mg/kg	- 500.00	- 2500.00	> 2500.00

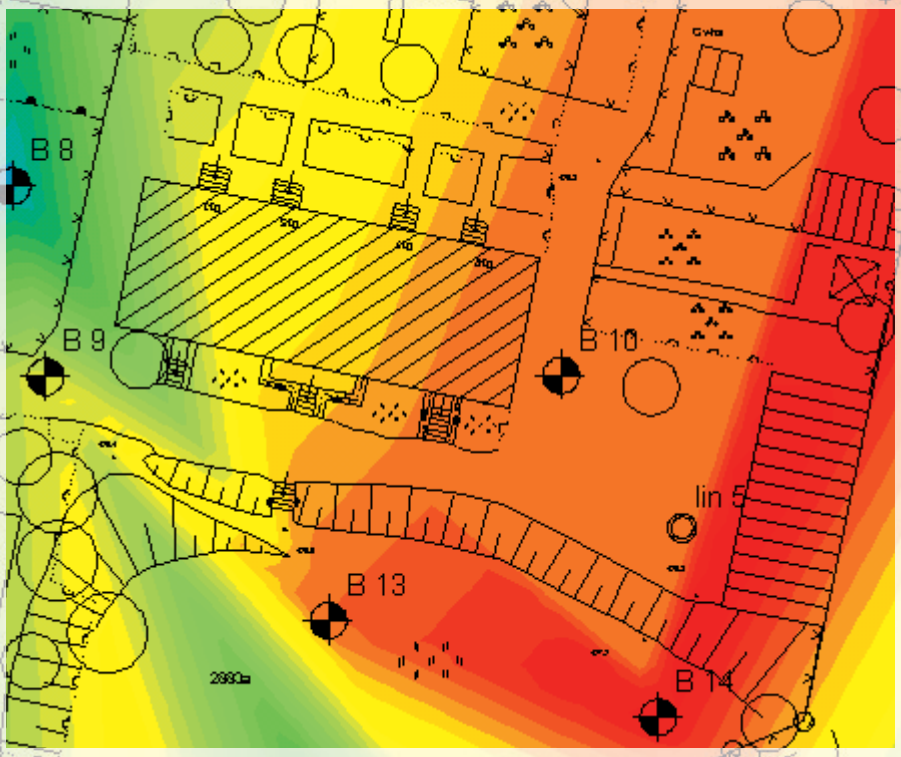
Untersuchung von Boden: Metalle und Halbmetalle im Eluat

					(LfW)
Arsen	(As)	in mg/l	- 0.01	- 0.04	> 0.04
Blei	(Pb)	in mg/l	- 0.03	- 0.10	> 0.10
Cadmium	(Cd)	in mg/l	- 0.01	- 0.02	> 0.02
Chrom	(Cr)	in mg/l	- 0.05	- 0.20	> 0.20
Kupfer	(Cu)	in mg/l	- 0.05	- 0.20	> 0.20
Nickel	(Ni)	in mg/l	- 0.05	- 0.20	> 0.20
Quecksilber	(Hg)	in mg/l	- 0.00	- 0.00	> 0.00
Zink	(Zn)	in mg/l	- 0.50	- 2.00	> 2.00

Grenzwertlisten:
LfW = LfW Bayern Merkblatt 3.8-1

Detailed legend

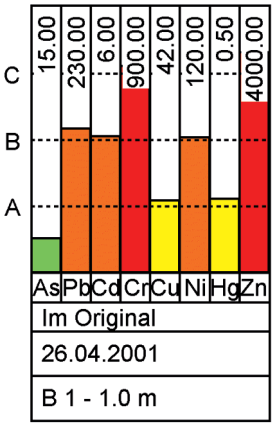
- Editing site maps with import and export of DXF from the CAD
- Support of blocks in DXF
- Complete layer management with switch on/off and freeze
- Inserting images and scanned plans through bitmaps
- Editing with extensive CAD tools: lines, texts, polygons, intersection, symbols, dimension strings
- Optional graphical input with/ without grid, snap and ruler tools or with the keyboard
- Limit values database with detailed lists of limit and directing values, freely extendable

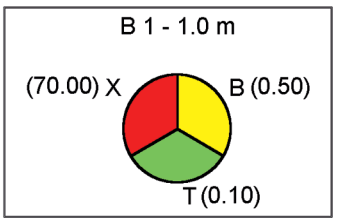


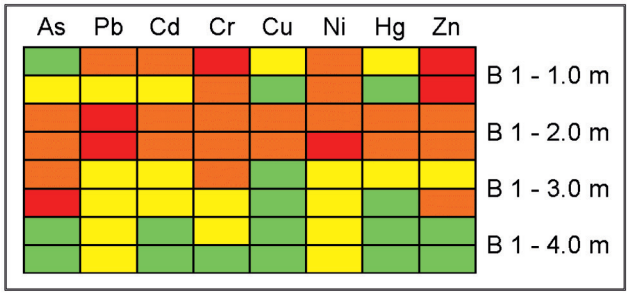
Graphic with color areas

- Input of measure values arranged according to date, point of measuring, depth, types and groups, structured with customizable material lists
- Clear tree structure for all measure results
- Selection in order to display on different plans through different material lists
- Different display options: boxes, circles, beams
- Optional graphic of distributions with elevation lines or color areas
- Automatic legend for all graphics incl. limit values
- Data base storage in Microsoft Access format, interface to MS Excel
- Plan formats from A4 to A0 and customizable formats
- Hardcopy tool for quick output of surveys and excerpts on A4

Different display options





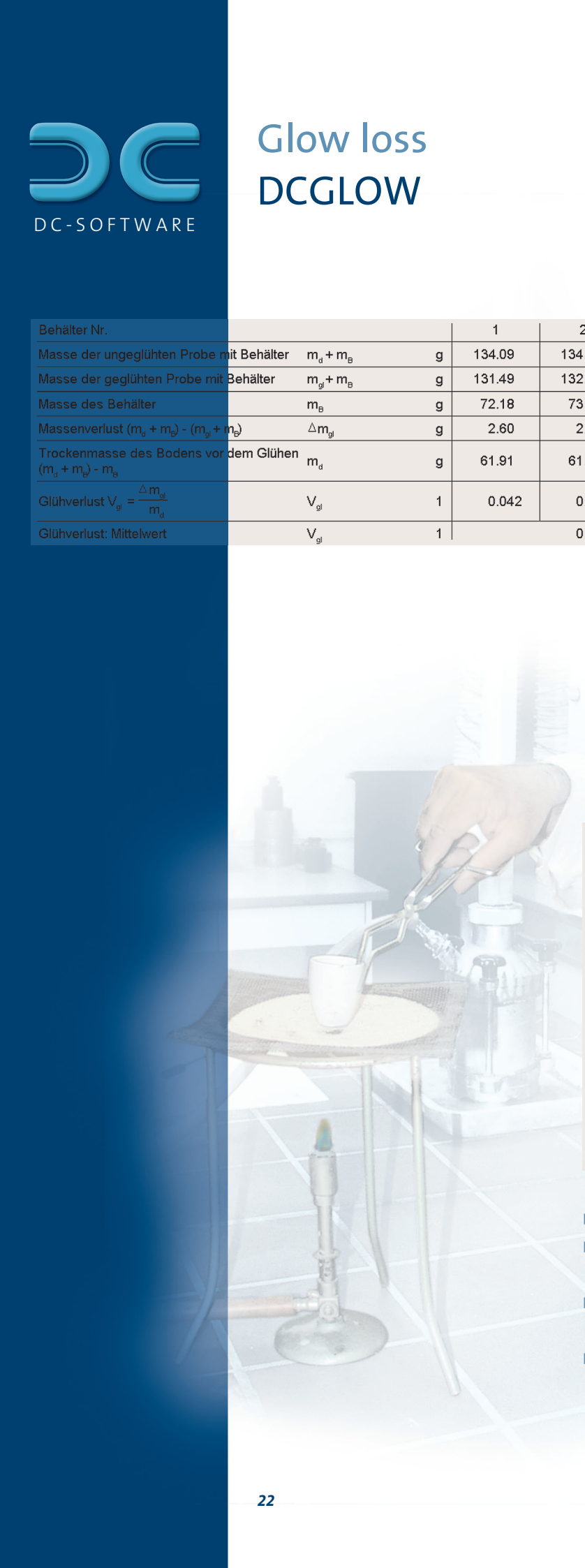


DC-SOFTWARE

Glow loss
DCGLOW

Behälter Nr.			1	2	3
Masse der ungeglühten Probe mit Behälter	$m_d + m_B$	g	134.09	134.55	133.06
Masse der geglühten Probe mit Behälter	$m_{gl} + m_B$	g	131.49	132.16	130.43
Masse des Behälter	m_B	g	72.18	73.04	71.97
Massenverlust $(m_d + m_B) - (m_{gl} + m_B)$	Δm_{gl}	g	2.60	2.39	2.63
Trockenmasse des Bodens vor dem Glühen $(m_d + m_B) - m_B$	m_d	g	61.91	61.51	61.09
Glühverlust $V_{gl} = \frac{\Delta m_{gl}}{m_d}$	V_{gl}	1	0.042	0.039	0.043
Glühverlust: Mittelwert	V_{gl}	1		0.041	

- Glow loss acc. to DIN 18 128
- Determination of the mass loss and glow loss
- Output of all test data in a table

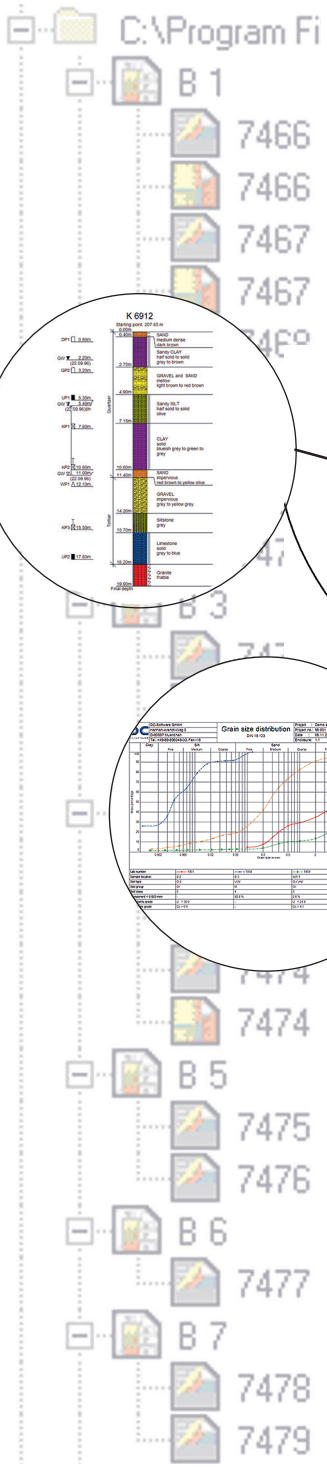


Lime content
DCLIME

Trockenmasse der Probe	m_d	g	0.75
Temperatur	T	Grad	21.90
absoluter Luftdruck	p_{abs}	kPa	102.50
Gasvolumen für Calcit-Anteil	V'_G	cm³	42.00
Gasvolumen	V_G	cm³	82.30
Volumen des Gases	V_0	cm³	76.78
Masse Karbonatanteil	m_{Ca}	g	0.345
Kalkgehalt	$V_{Ca} = \frac{m_{Ca}}{m_d}$		0.460
Volumen des CO_2-Gases	V'_0	cm³	39.18
Masse Calcitanteil	m'_{Ca}	g	0.176
Calcitanteil	$V'_{Ca} = \frac{m'_{Ca}}{m_d}$		0.235
Dolomitanteil	$V''_{Ca} = V_{Ca} - V'_{Ca}$		0.225

- Lime content acc. to DIN 18 129
- Determination of carbon portion and lime content
- Optionally calcite portion and dolomite portion
- Output of all test data in a table

Integrated soil mechanics
DCLABTEGRA



Tree structure of the test assignments

- Clearly arranged composition of field and laboratory tests for arbitrary projects
- Single projects or complete folders
- Complete overview over years, groups of projects or all the tests

- Project files are grouped by project numbers
- Assignment by places of sampling/borings, depths of sampling and lab numbers

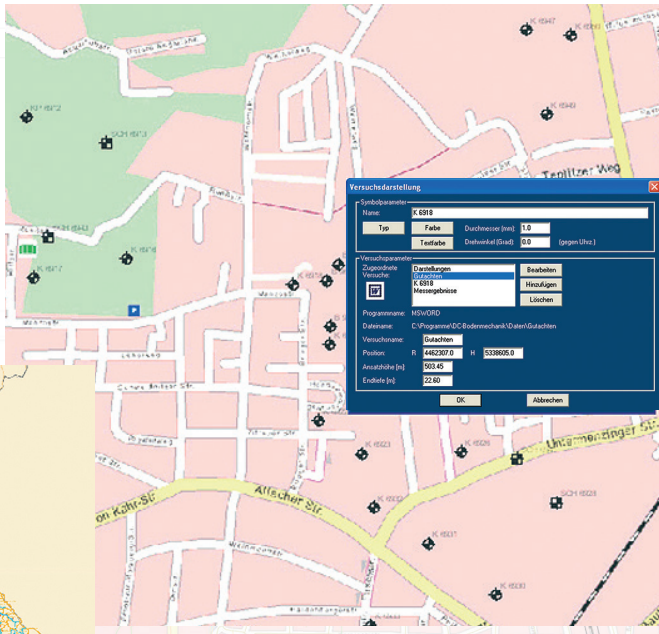
Clearly arranged table with assignment of the tests

- Borings, dynamic probings, cone penetration tests, grain size distributions, consistency limits, proctor tests, plate load tests, oedometer tests, shear tests, density, water content, permeability tests, lime content, glow loss: free selection of the desired test types

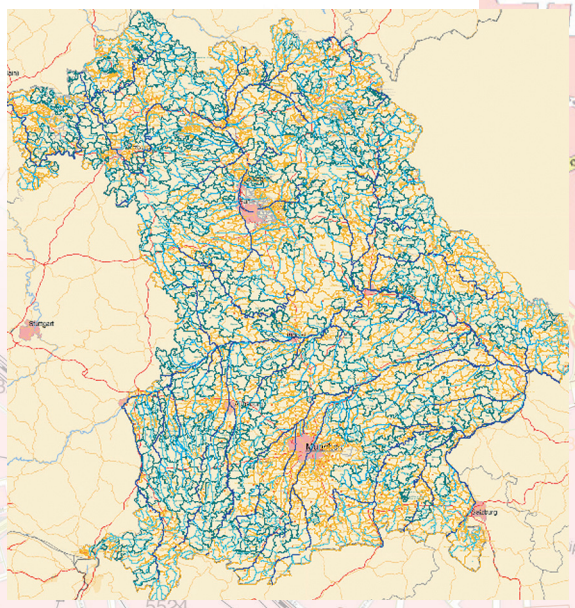
- Free selection of results: soil type, soil group, soil class, U_C, C_C, permeability coefficient, liquid limit, plastic limit, ...
- Direct selection of the single tests by clicking in the tree of tests
- Immediate editing of the tests in the individual programs (DCSIEVE, DCCONS,...)
- Composition of masses for the billing

DC-SOFTWARE

Administration of bore hole logs in maps
DCGIS



Administration of documents



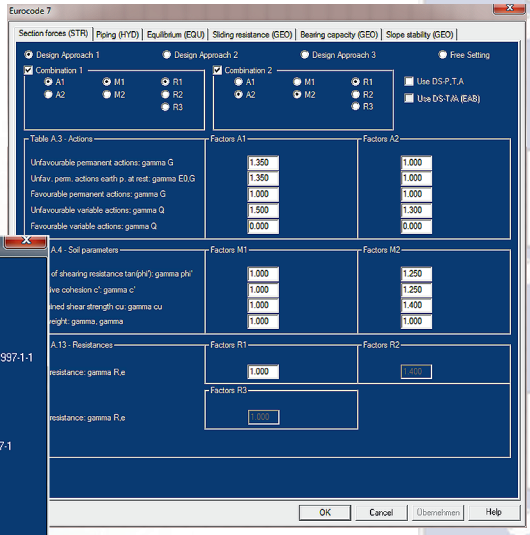
Imported DXF map of Bavaria

- Administration of all bore hole logs and other tests on an overview plan
- Create project maps e.g. as a cut-out with selection of tests
- High-quality maps from Germany map down to city map level, additionally Austria and Switzerland
- Import of maps from land surveying offices, via DXF or of picture files possible
- Insertion of bore hole logs via Gauss-Krueger coordinates or graphical positioning
- Administration of different types of documents (Word, Excel, PDF, photos, ...) at the bore hole positions (document management)
- Standard maps for one federal state included with the program
- High-quality TeleAtlas maps for the complete area of Germany/ Austria/Switzerland available
- Automatic geo-referencing in Gauss-Krueger or Scout-Cylinder coordinates
- Import of geo-referenced DXF maps (e.g. topological maps)
- Import of any type of maps as picture files (BMP, TIFF, JPEG) and DXF plans with subsequent geo-referencing
- Automatic transfer of all bore hole logs from the program DCBORE
- Optional setting of bore hole logs into the map and transfer of the coordinates to DCBORE
- Recall of available bore hole logs directly from the map by double click
- Supply of map cut-outs to DCBORE for the header sheet of the layer specification: automatic incorporation for all borings with Gauss-Krueger coordinates

Complete support with all 3 Design Approaches for any country

DC-Foundation with Eurocode 7

- Predefined settings for the proposed values acc. to Eurocode 7, for Germany (DIN EN 1997-1 / DIN 1054:2010), Austria (OENORM B 1997-1-1), France (NF EN 1997-1), Great Britain (BS EN 1997-1), Italy (UNI EN 1997-1 / NTC 2008) and Spain (UNE EN 1997-1)
- Easy selection by the flag, all the settings of the corresponding National Annex are predefined automatically
- Free selections for any country:

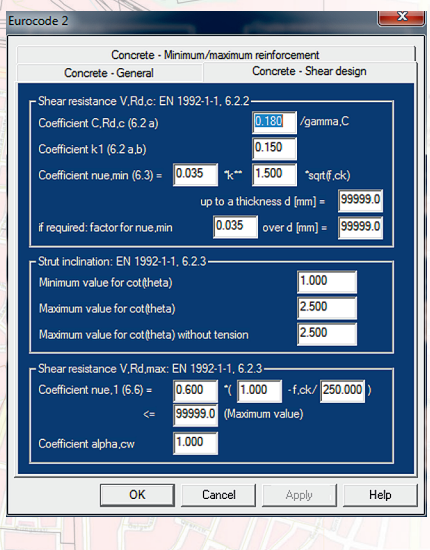


Free setting of the Design Approach and safety factors

Selection of the predefined countries and free setting

- Selection of the Design Approach (e.g. 1 for Great Britain, 2 for Germany/France, 3 for slope stability in Germany)
- Number of the combinations to be calculated (two for Design Approach 1, one for Design Approach 2 and 3)
- Groups of partial safety factors for actions (A1, A2), soil parameters (M1, M2) and resistances (R1, R2, R3, for piles R4)
- Design situations DS-P, DS-T, DS-A and DS-T/A (EAB) if required (Germany)
- Values of the safety factors, e.g. 1.35/1.50/1.40 for permanent/variable actions and passive earth pressure

Design acc. to Eurocode 2 and 3



Free definition of the national determined parameters

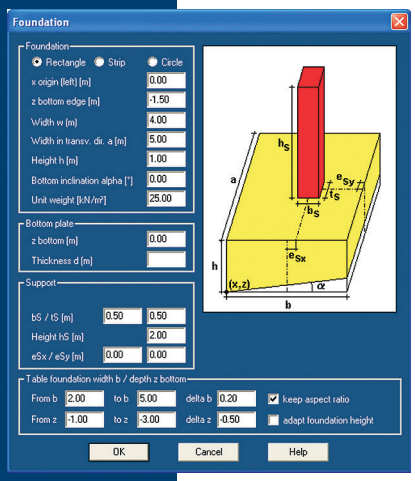
- Predefined setting for the proposed values acc. to Eurocode 2 and 3, for Germany (DIN EN 1992 / DIN EN 1993), Austria (OENORM B 1992 / OENORM B 1993), France (NF EN 1992 / NF EN 1993), Great Britain (BS EN 1992 / BS EN 1993), Italy (UNI EN 1992 / UNI EN 1993) and Spain (UNE EN 1992 / UNE EN 1993)

Automatically or choose freely:

- Design of reinforced concrete acc. to Eurocode 2: Verifications for bending, punching, shear, minimum/maximum reinforcement and non-reinforced concrete depending on the program
- Steel design acc. to Eurocode 3: Verifications for bending and shear, stability (buckling) as well as sheet pile walls and piles acc. to Eurocode 3-5
- Input for any National Annex

DC-SOFTWARE

Bearing capacity analysis
DC-Bearing



Footing input

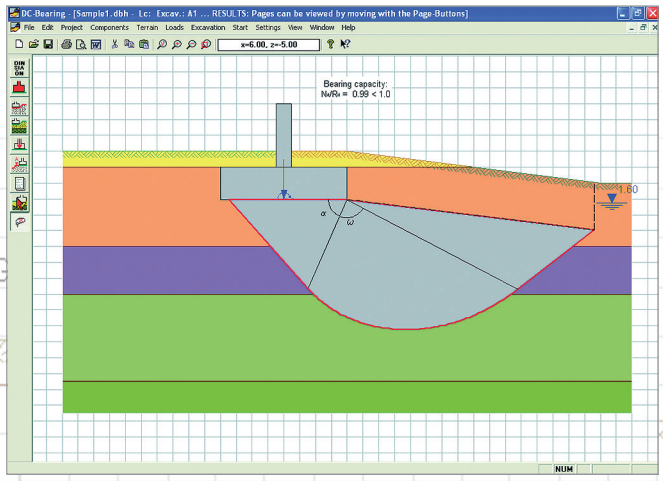
- Bearing capacity analysis acc. to Eurocode 7, DIN 1054:2010, DIN 4017:2006, OENORM B 4435-2, SIA 267, Terzaghi and Brinch Hansen
- Analysis with partial safety factors or global safety
- German, English, French, Romanian, Bosnian language
- Rectangular, strip and circular footings
- Several load cases, eccentric and inclined loads
- Different excavation conditions are possible
- Variable layering, calculation with weighted soil layer parameters (no limitation to +/- 5°)
- Inclined foundation base possible
- Water levels in order to consider the lift

- Graphic of support/wall and foundation slab
- Slopes through ground inclination coefficients
- Calculation of the limit load, permissible load or safety factor
- Table for different footing widths and depths
- Graphic with view, plan view and unit of failure

Table of footing widths

Failure load and safeties with different foundation depths and widths
Depth of the foundation bottom edge: -1.00 m
(aspect ratio b/a = 0.80)

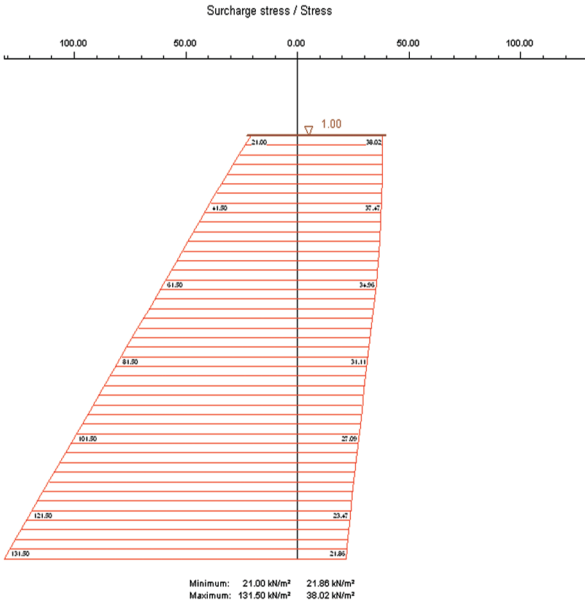
Width Found. [m]	Equivalent width [m]	Unit weight γ_s [kN/m³]	Unit weight γ_u [kN/m³]	Friction φ [°]	Cohesion c [kN/m²]	Failure load V_b [kN]	Safety η
2.00	1.84	18.25	12.88	29.56	1.74	1837.13	0.43
2.20	2.04	18.25	12.76	28.62	2.10	2094.91	0.49
2.40	2.24	18.25	12.63	28.07	2.38	2443.71	0.56
2.60	2.44	18.25	12.53	27.69	2.61	2857.51	0.66
2.80	2.64	18.25	12.48	27.41	2.81	3330.64	0.76
3.00	2.84	18.25	12.43	27.14	2.99	3833.07	0.87
3.20	3.04	18.25	12.38	26.82	2.89	4262.34	0.95
3.40	3.24	18.25	12.31	26.44	2.60	4606.33	1.02
3.60	3.45	18.25	12.23	26.08	2.47	4998.55	1.10
3.80	3.65	18.25	12.16	25.67	2.40	5383.13	1.17
4.00	3.85	18.25	12.08	25.34	2.36	5844.39	1.26
4.20	4.05	18.25	12.00	25.10	2.33	6381.23	1.36
4.40	4.25	18.25	11.92	24.87	2.32	6950.79	1.46
4.60	4.45	18.25	11.84	24.68	2.30	7568.14	1.57
4.80	4.66	18.25	11.76	24.51	2.29	8232.16	1.69
5.00	4.86	18.25	11.69	24.37	2.29	8958.69	1.82



Ground-failure figure with slope inclination

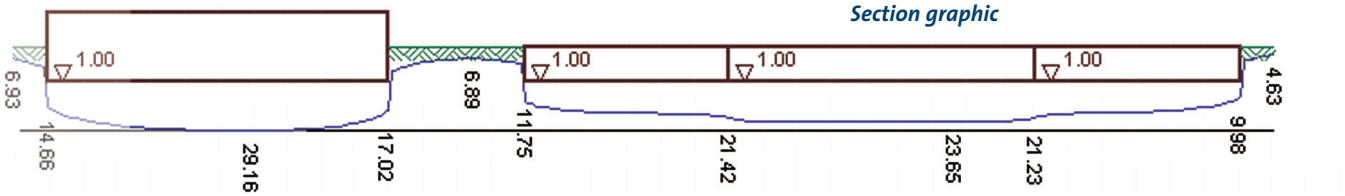
Settlement analysis
DC-Settle

- Settlement analysis acc. to Eurocode 7, DIN 1054:2010, DIN 4019, SIA 267
- German, English, French, Romanian language
- Arbitrary number of foundations with mutual influence
- Flexible or rigid load areas
- Variable layering with stiffness modulus
- Variable soil layer input through bore points with interpolated layering for intermediate points
- Water level in order to consider the lift
- Different load cases with concentrated, distributed loads and moments
- Graphic of the settlement course in the terrain with elevation lines or color areas
- Customizable sections through the terrain
- Interactive display of settlements at any position
- Evaluation points with stress diagram

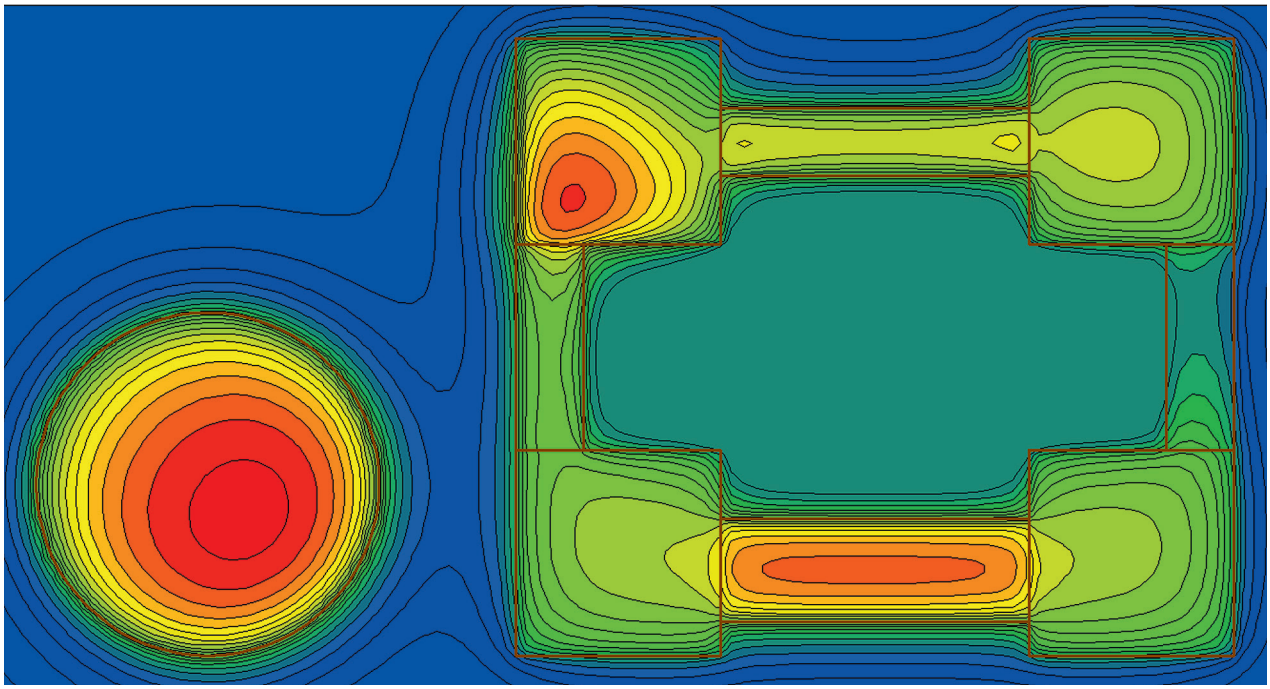


Stresses at the point of evaluation

Section graphic

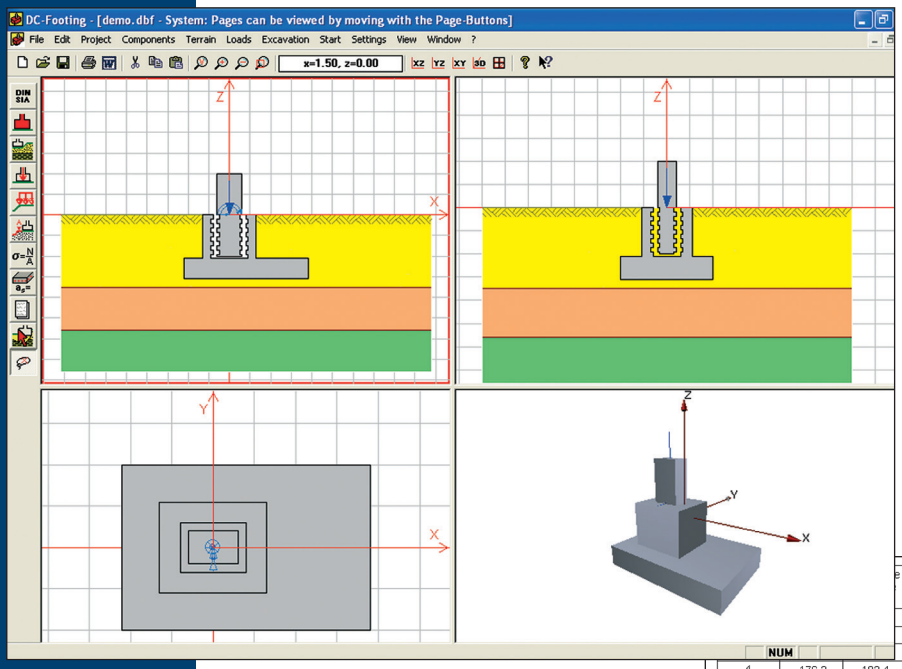


Settlement course with color areas



DC-SOFTWARE

Design of footings
DC-Footing



4 window display with selectable views (xz, yz) and top view, 3D view

			Sliding T_d/R_d	Bear.cap. N_d/R_d	max. settlement [mm]	$A_{s,z}$ bottom [cm²]	$A_{s,y}$ bottom [cm²]	$A_{s,z}$ top [cm²]	$A_{s,y}$ top [cm²]
			0.00	0.10	0.8	12.4	16.5	0.0	0.0
			0.12	0.17	1.2	12.4	16.5	0.0	0.0
			0.10	0.31	2.2	21.9	16.5	0.0	0.0
4	176.3	182.4	0.04	0.26	1.9	17.6	16.5	0.0	0.0
5	187.0	211.8	0.10	0.31	2.2	20.6	16.5	0.0	0.0
6	78.7	80.9	0.00	0.11	0.8	12.4	16.5	0.0	0.0
7	96.1	122.4	0.12	0.19	1.2	12.4	16.5	0.0	0.0
8	187.0	211.8	0.10	0.32	2.2	23.4	16.5	0.0	0.0
9	176.3	182.4	0.04	0.27	1.9	19.1	16.5	0.0	0.0
10	187.0	211.8	0.10	0.32	2.2	22.1	16.5	0.0	0.0
11	78.7	80.9	0.00	0.10	0.8	12.4	16.5	0.0	0.0
12	96.1	122.4	0.12	0.18	1.2	12.4	16.5	0.0	0.0
13	187.0	211.8	0.10	0.32	2.2	21.8	16.5	0.0	0.0
14	176.3	182.4	0.04	0.27	1.9	17.5	16.5	0.0	0.0
15	187.0	211.8	0.10	0.32	2.2	20.5	16.5	0.0	0.0
16	78.7	80.9	0.00	0.11	0.8	12.4	16.5	0.0	0.0
17	96.1	122.4	0.12	0.20	1.2	12.4	16.5	0.0	0.0
18	187.0	211.8	0.10	0.33	2.2	23.3	16.5	0.0	0.0
19	176.3	182.4	0.04	0.28	1.9	19.0	16.5	0.0	0.0
20	187.0	211.8	0.10	0.33	2.2	22.0	16.5	0.0	0.0

Critical results:

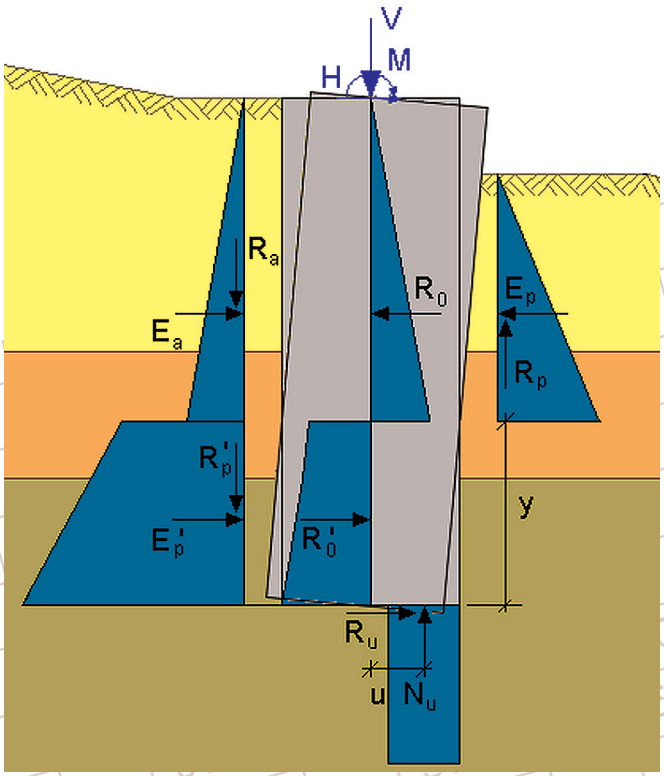
Normal base pr. [kN/m²]	max. base pressure [kN/m²]	Sliding T_d/R_d	Bear.cap. N_d/R_d	max. settlement [mm]	$A_{s,z}$ bottom [cm²]	$A_{s,y}$ bottom [cm²]	$A_{s,z}$ top [cm²]	$A_{s,y}$ top [cm²]
187.0	211.8	0.12	0.33	2.2	23.4	16.5	0.0	0.0

Result output in table form

- Analysis of single, strip and circular footings, block and sleeve footings
- German, English, French, Romanian, Hungarian language
- Automatic load case superposition acc. to Eurocode 0, SIA 260 for the design
- Load cases acc. to DIN 1054:2010 for foundation engineering verifications
- Design of reinforced concrete acc. to Eurocode 2, DIN 1045-1, OENORM B 4700, SIA 262 and British Standard BS 8110
- Design for bending, shear force, punching and foundation sleeve
- Excavation stages with different bonding and slopes on 4 sides
- Calculation of the highest-loaded quarter for the punching design with eccentric loads
- Foundation engineering verifications: overturning, stability, bearing capacity, soil pressure and settlement acc. to Eurocode 7, DIN 1054:2010, DIN 1054:1976 and SIA 267
- Automatic optimization of the footing geometry (width and depth)
- Extensive compilation of all load case combinations or short print
- Selection of the desired graphics: side views, top view and/or 3D view

Analysis of fixed pylon footings
DC-Footing/Pylon

- Approach acc. to Steckner improved with soil layers, ground water level, excavation depths and berms!
- German, English, French, Romanian, Hungarian language
- Analysis acc. to Eurocode 7, DIN 1054:2010 and SIA 267
- Fixing of the footing by active and passive earth pressure
- Activation of the earth pressure by rotation of the footing
- Iteration of the level of the zero line y
- Serviceability check by perm. inclination
- Stability analysis by the limit value of load moment



Fixed footing with earth pressures

Stability analysis

Critical load combination no. 2

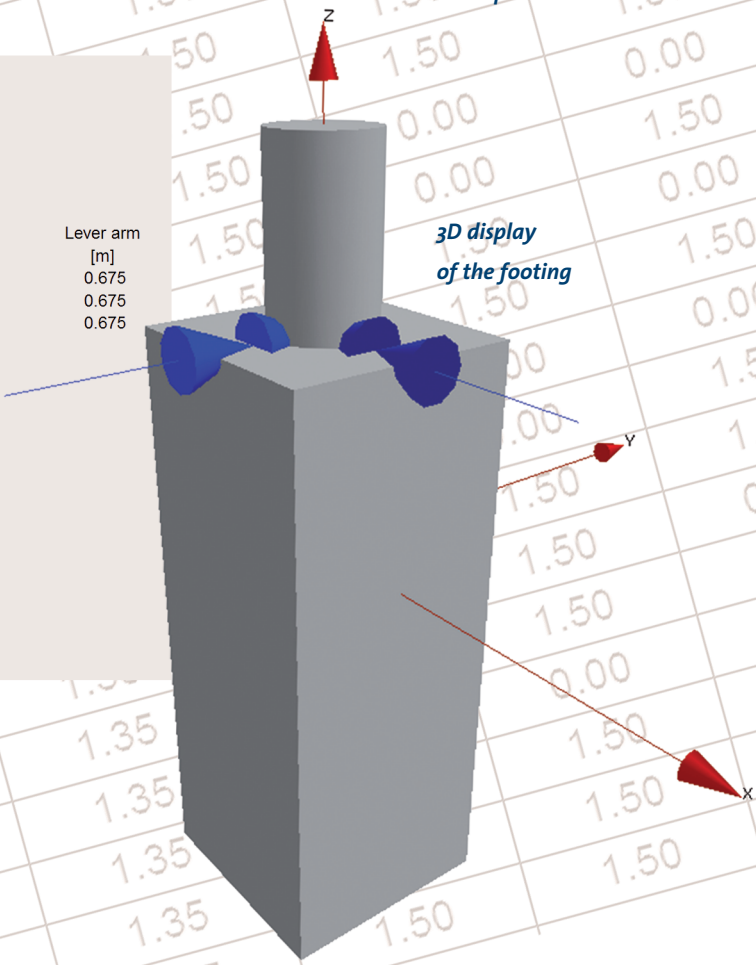
Vertical load N_α	=	102.6 kN
Horizontal load H_d	=	1.4 kN
Moment at top edge M_d	=	135.0 kNm

Earth pressure forces and lever arms rel. to footing top edge (Design values)

	Earth pressure [kN]	Lever arm [m]	Friction [kN]	Lever arm [m]
Active $E_{a,d}$	63.7	1.881	17.3	0.675
Passive above zero line $E_{p,d}$	103.5	2.078	53.0	0.675
Passive below zero line $E_{p,d}'$	26.1	2.946	12.1	0.675
At rest above zero line $E_{0,d}$	70.8	1.846	28.7	
At rest below zero line $E_{0,d}'$	10.2	2.946	3.7	
Res. earth resistance above zero line $E_{w,d}$	68.4	2.165		
Res. earth resistance below zero line $E_{w,d}'$	29.8	2.946		

Application of wall friction angle δ_p of		0.667*ϕ
Ideal pressure width b_{id}	=	2.147 m
Height zero line y above base	=	0.210 m
Soil pressure $p_{u,d}$	=	486.6 kN/m²
Soil pressure force $N_{u,d}$	=	64.6 kN
Lever arm soil pr. force u	=	0.626 m
Friction force $R_{u,d}$	=	33.9 kN
Ultimate moment M_u	=	139.1 kNm
M_d < M_u, utilization factor	=	0.970 *** Check fulfilled ***

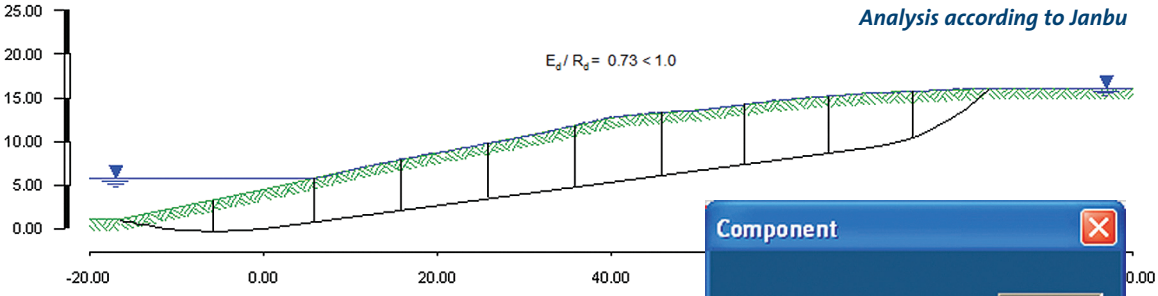
Stability analysis acc. to Steckner



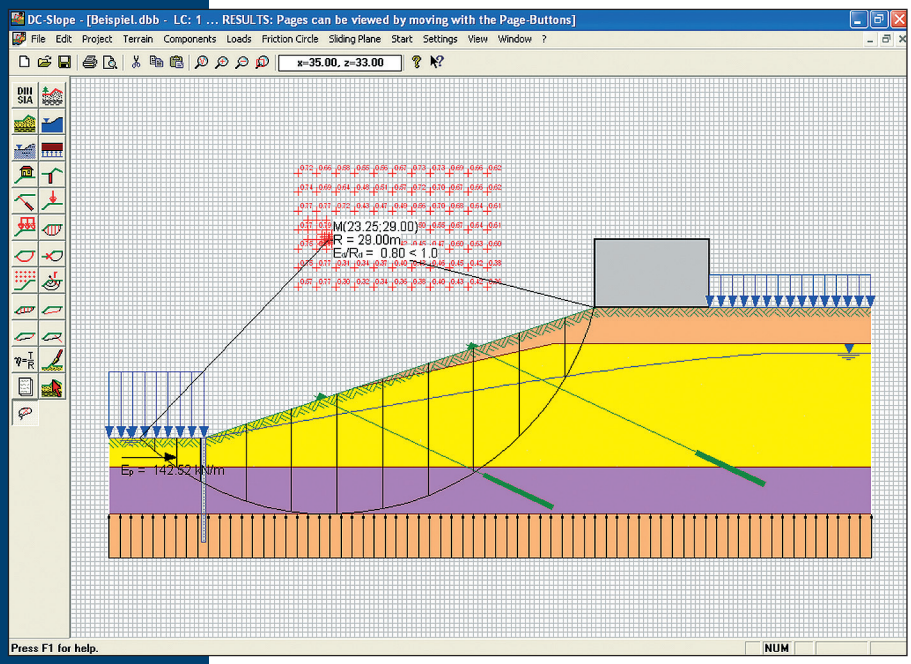
3D display of the footing

DC-SOFTWARE

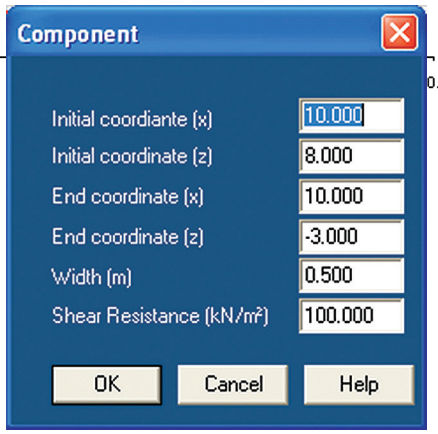
Slope stability and ground failure
DC-Slope



Analysis according to Janbu



Analysis according to Krey-Bishop



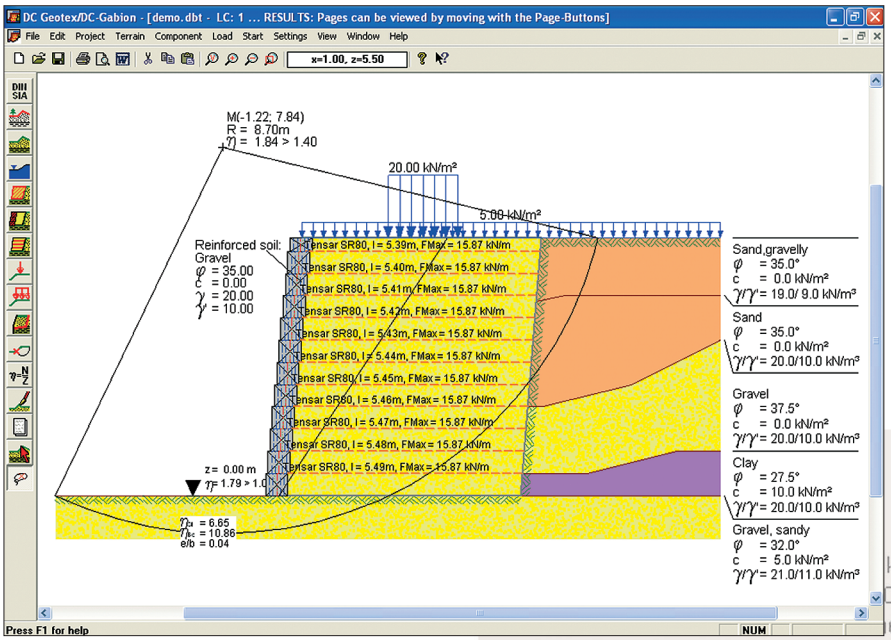
Definition of components

- Slope stability and ground failure acc. to Eurocode 7, DIN 1054:2010, DIN 4084, SIA 267
- Analysis with partial safety factors or with global safety
- German, English, French, Italian, Romanian, Russian language
- Approach according to Krey-Bishop (friction circle) and Janbu (arbitrary slip planes)
- Free terrain and layer course
- Ground water and seepage course
- Different load cases with concentrated and distributed loads, dead and live loads

- Earthquake loads
- Consideration of anchors and grouted piles
- Optional iteration of the anchor lengths in order to obtain the required safety
- Application of buildings (weight) and components (shear force)
- Pore-water pressure and excess pressure
- Impermeable layers with artesian water pressure
- Iteration of center and/or radius, optionally with predefined range
- Automatic determination of the minimal safety
- Free lamellae arrangement
- Optional predefinition of a fixed point

Analysis of Reinforced Earth with geosynthetics and gabions

DC-Geotex / DC-Gabion



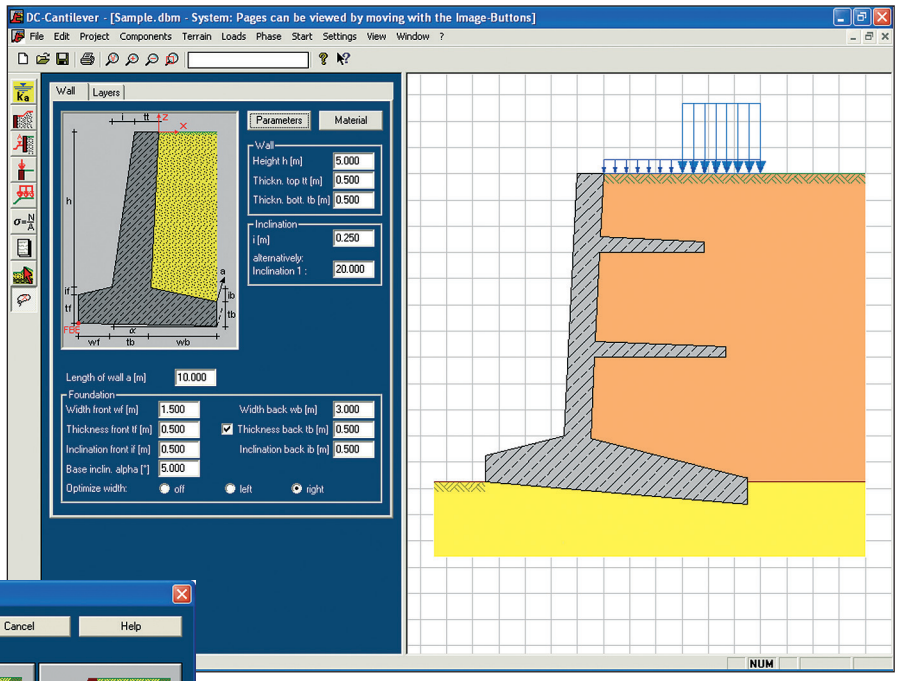
- Different types of facing with checks (eccentricity, sliding, transfer of the fastening force, gabion wire)
- Selection of predefined geosynthetics with reduction factors, freely extendable
- Automatic function for a fast input of many geosynthetics layers
- Different load cases
- Arbitrary course of soil layers by earth pressure calculation acc. to Culmann
- Appealing result graphics
- Alternatively extensive or short output

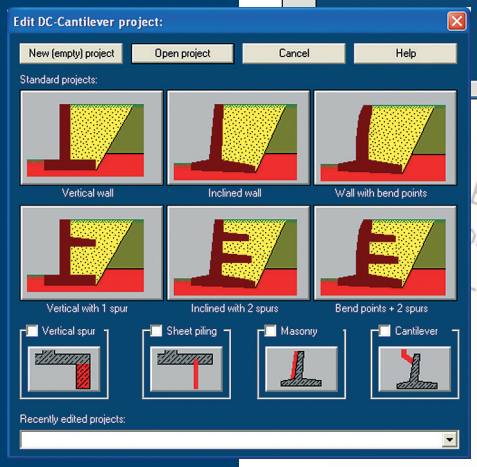
- Reinforced earth and gabions
- German, English, French, Romanian language
- Analysis of Reinforced Earth with geosynthetics based on EBGEO with partial safety factors (DC-Geotex)
- Analysis of gabions etc. acc. to the bulletin on supporting structures from concrete elements, layered blocks and gabions (DC-Gabion)

- Analysis acc. to Eurocode 7, DIN 1054:2010, SIA 267, British Standard BS 8006
- Calculation of the required geosynthetics lengths
- Check of the internal stability using the block sliding approach
- Check of the external stability:
  - Safety against overturning
  - Stability check
  - Safety against sliding
  - Bearing capacity
  - Slope stability
- Check of the wraparound length and of the earth pressure on the facing

DC-SOFTWARE

Analysis of cantilever walls
DC-Cantilever



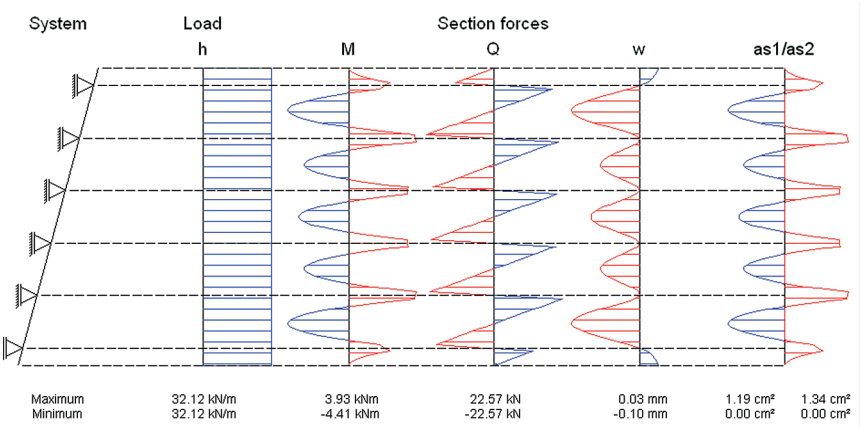


Different wall types

- Analysis acc. to Eurocode 7, DIN 1054:2010, DIN 4085, SIA 267, OENORM B 4434
- German, English, French, Romanian, Bosnian language
- Design of reinforced concrete acc. to Eurocode 2, DIN 1045-1, DIN 1045, SIA 262, OENORM B 4700 and British Standard BS 8110
- Optimization of the footing width, alternatively at the supported or valley side: calculation of the width for which all checks are fulfilled
- Stability checks: overturning, stability, sliding, bearing capacity, slope stability, check of soil pressure and settlement
- Variable soil layers
- Consideration of a backfill
- Application of compaction earth pressure
- Different earth pressure application (active, increased active, at rest) for the wall design and stability checks
- Exact application of the substitutional wall at the footing spur with ϑ_a'
- Check of the safety for slope stability
- Most simple use by input of the sizes by keyboard, double click on wall points or dragging with the mouse
- High-quality result output with integration of the result graphics

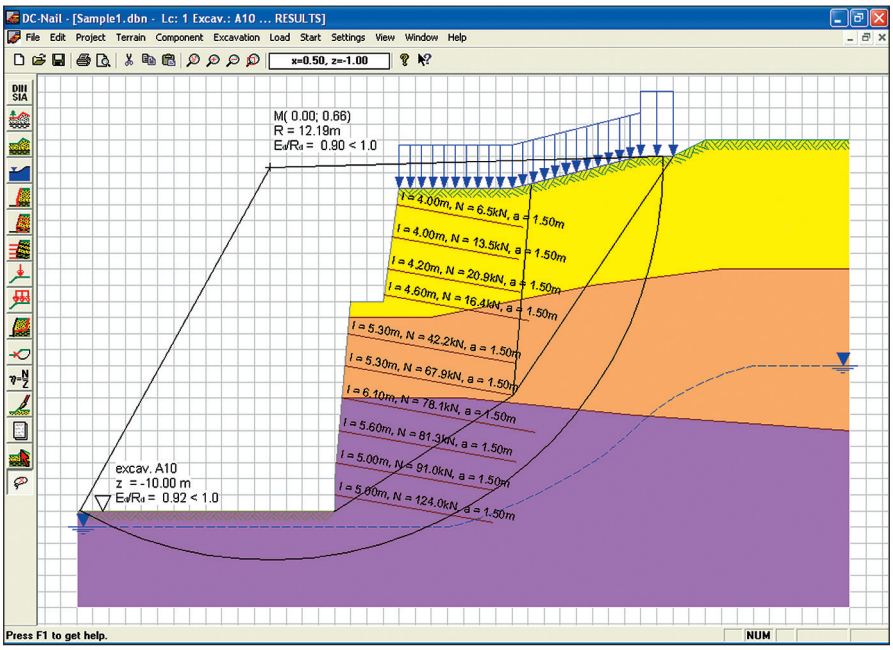
Analysis of soil nailings
DC-Nail

- Analysis of soil nailings acc. to Eurocode 7, DIN 1054:2010, DIN 1054:1976, SIA 267
- Design of the shotcrete wall acc. to Eurocode 2, DIN 1045-1, DIN 1045, OENORM B 4700, SIA 262, BS 8110
- Analysis with partial safety factors or with global safety
- German, English, French, Italian, Spanish language



Section forces and reinforcement

- Analysis according to the general block sliding approach
- Determination of the internal and external stability
- Earth pressure calculation according to Culmann for arbitrary ground and soil layer courses
- Customizable wall course with grading
- Free ground-water courses
- Arbitrary excavation conditions with automatic generation, unlimited number of nail rows, optional earth-pressure redistribution
- Load cases with concentrated and distributed loads



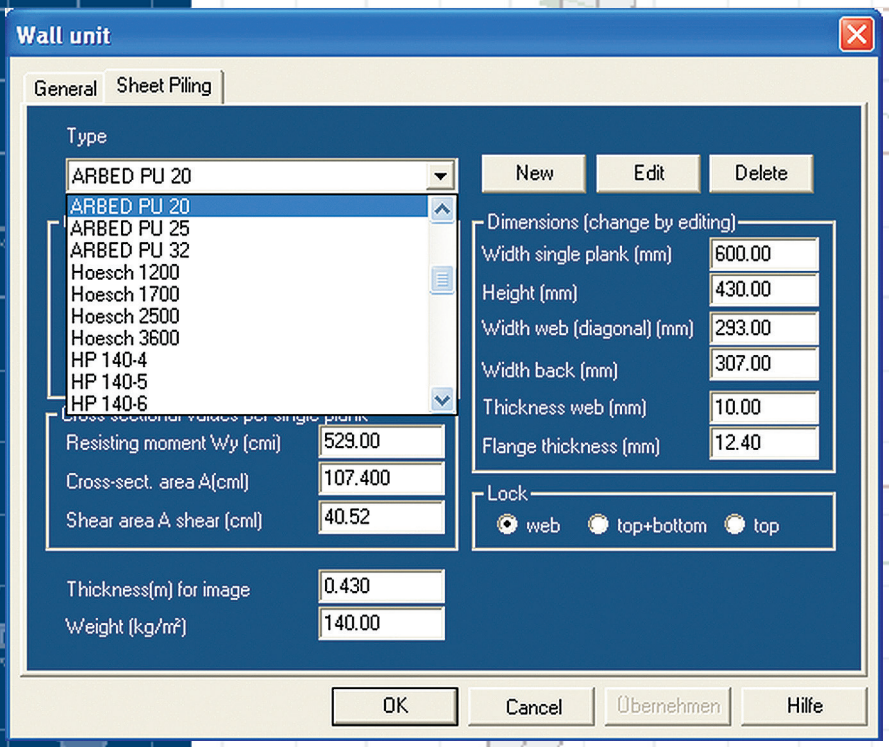
Nail forces and slope stability analysis

- Determination of the nail forces and safeties
- Calculation of the nail lengths and diameters
- Design of the shotcrete wall optionally as slab or continuous girder
- Punching design at the nail-head plate
- Stability analysis: bearing capacity and slope stability analysis
- Graphical display: excavations and load cases, nail geometry, section forces, reinforcement

DC-SOFTWARE

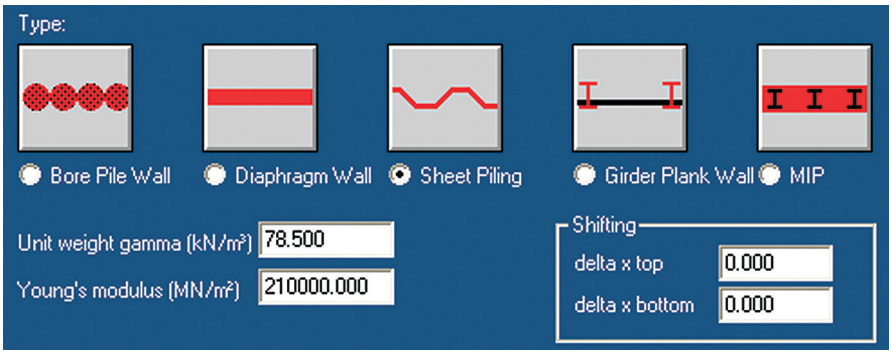
Analysis of foundation pit walls
DC-Pit

- Analysis of foundation pit walls acc. to Eurocode 7, DIN 1054:2010, DIN 4085, EAB 2006, EAU 2004, SIA 267, OENORM B 4434, British Standard BS 8002
- Design option (Dimensioning): Steel design acc. to Eurocode 3, DIN 18 800, SIA 263, British Standard BS 5950, reinforced concrete acc. to Eurocode 2, DIN 1045-1, DIN 1045, OENORM B 4700, SIA 262, British Standard BS 8110
- Analysis with partial safety factors or with global safety
- German, English, French, Italian, Bulgarian, Romanian, Russian language
- Bore pile walls, diaphragm walls, sheet pilings, girder plank walls, MIP (Mixed In Place)
- Selection of predefined sheet piling types or girder profiles (HE-A, HE-B, etc.)
- Wall types to be combined (e.g. inserted girder on a bore pile wall)
- Inclined walls with earth pressure on the inclined wall
- Active, increased active earth pressure or pressure at rest
- Different redistribution types: triangle, trapezium, one or several rectangles, affined figure
- Dead and live loads in different load cases, unlimited imposed loads and block loads with different earth pressure distribution, excavation-related loads
- Different soil layers and slopes
- Arbitrary water levels in front of and behind the wall
- Building and dismantling stages
- Adjustable anchor positions and props per excavation incl. pre-deformation, spring constant and pretension
- Inactive anchors in order to analyze variants
- Different foot bearings
- Fixed toe depth or iteration
- Iteration of the inclination angles δ_p and δ_c
- Verification of the transfer of vertical forces by skin friction and end bearing

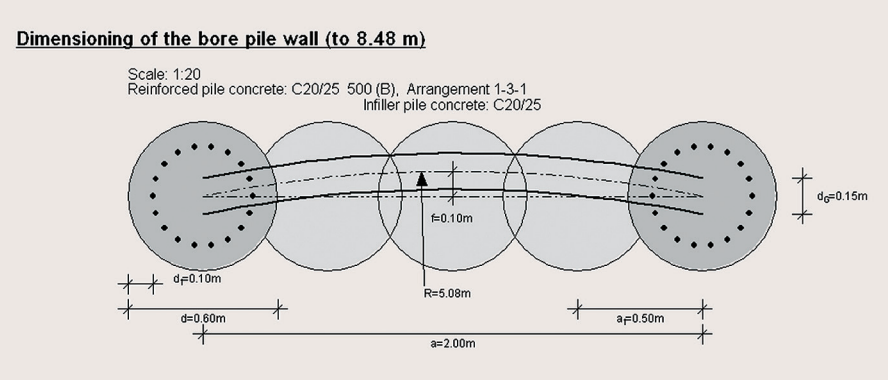


Selection of sheet pile profiles

- Elastic support with automatic adaptation to the passive earth pressure incl. bedding acc. to EAB R 102
- Calculation of section forces with anchor and bedding forces
- Anchor analysis in the deep sliding plane
- Detailed result output

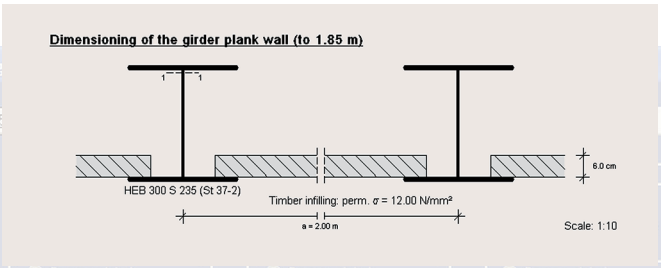


Different wall types



Design of bore pile walls (1-3-1)

- Graphic of the system, earth pressures, section forces and deformations
- Display of section forces alternatively characteristic and design values, from dead, live, water and total loads



Design of a girder plank wall

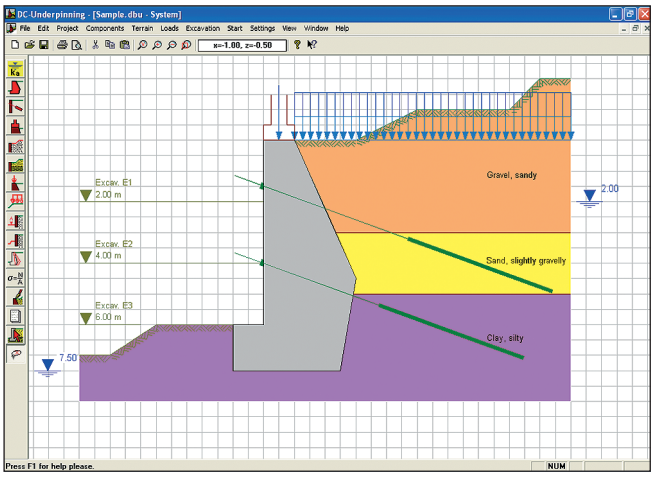
- **Dimensioning option** for the design of all components: sheet pilings, in-situ concrete walls incl. circular section of bored piles, girder planks, infillings in concrete, timber or steel, pile or shotcrete infilling, dimensioning of anchors and booms (steel or reinforced concrete)

DC-SOFTWARE

Analysis of building underpinnings and retaining walls

DC-Underpinning

- Analysis of building underpinnings and retaining walls acc. to Eurocode 7, DIN 1054:2010, DIN 1054:1976, SIA 267
- Wall design as concrete unit acc. to Eurocode 2, DIN 1045-1, DIN 1045, OENORM B 4700, SIA 262
- German, English, French language
- Arbitrary shape of the underpinning unit as a polygon, e.g. with spur

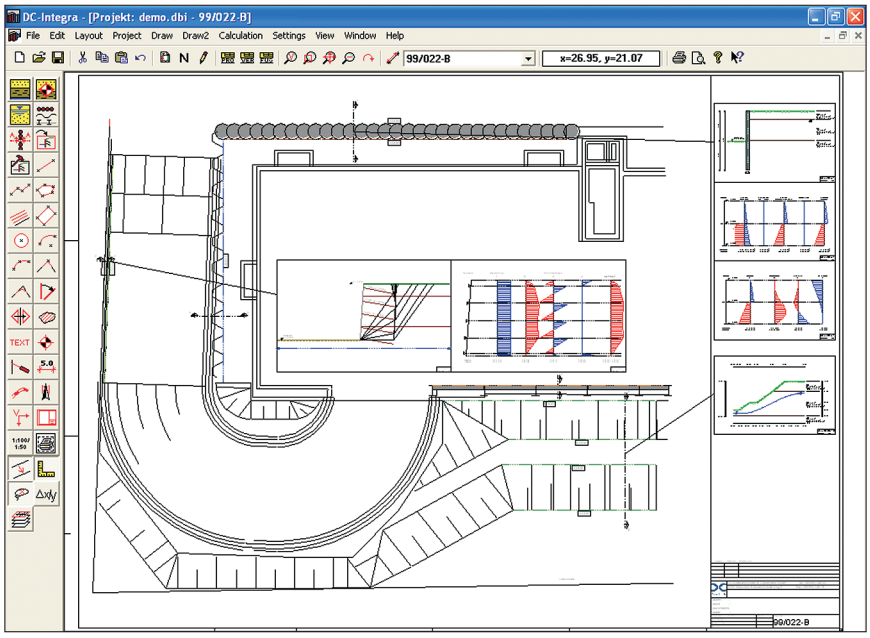


Underpinnings of any shape

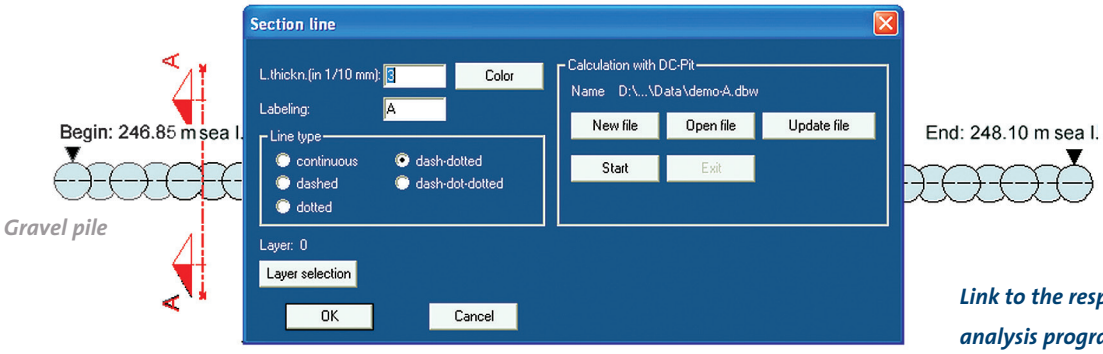
- Bends and jumps in the center line are possible
- Determination of the earth pressure on the inclined wall
- Active, increased active earth pressure or pressure at rest
- Automatic earth pressure determination with soil layer parameters or predefinition
- Different redistribution types: triangle, trapezium, one or several rectangles, affined figure
- Dead and live loads in different load cases, unlimited imposed loads and block loads with different earth pressure distribution, excavation-related loads
- Different soil layers and slopes
- Water levels, consideration of water and base water pressure
- Wall toe as free, elastic, supported or fixed
- Fixed toe depth or iteration
- Elastic support with automatic adaptation to the passive earth pressure incl. bedding acc. to EAB R 102
- Building and dismantling stages
- Adjustable anchor positions and props per excavation incl. pre-deformation, spring constant and pretension
- Determination of the section forces with anchor and bedding forces
- Inactive anchors for the analysis of variants
- Anchor design in the deep sliding plane
- Safety against sliding and bearing capacity, settlement calculation
- Graphics of the system, earth pressures, section forces and deformations
- Option: optimization of the wall width and anchor forces

Integrated foundation engineering
DC-Integra

- German, English, French language
- Import of plans from the CAD with DXF, export of plans into DXF, integration of images through bitmaps
- Complete layer management with switching on/off and freezing
- Edit process with extensive CAD tools: lines, texts, polygons, intersection, symbols, dimension strings, anchor symbols
- Assignment of wall types to lines by predefining parameters such as girder types, bore pile diameters and spacing
- Exact graphic of the wall with macros incl. depth data as well as joint options
- Management of soil layer data, variable through bore points
- Automatic interpolation of heights above sea level, with assignment to soil layers
- Definiton of the analysis sections through arbitrary intersection lines
- Management of all sections in a plan
- Automatic start of the pertaining analysis program: DC-Pit, DC-Nail, DC-Slope, DC-Underpinning
- Quick transfer of all geometrical and type data: wall type and parameters, thickness and soil layers to the calculation program
- Additional edit process (excavations, anchor lengths) and analysis in the calculation program
- Integration of the result graphics into the plan
- Update tool in case of modifications in the calculated section
- Permanent overview of all sections in the project through complete management in the plan
- Plan formats from A4 to A0 + customizable formats
- Hardcopy tool for quick output of overviews and excerpts on A4



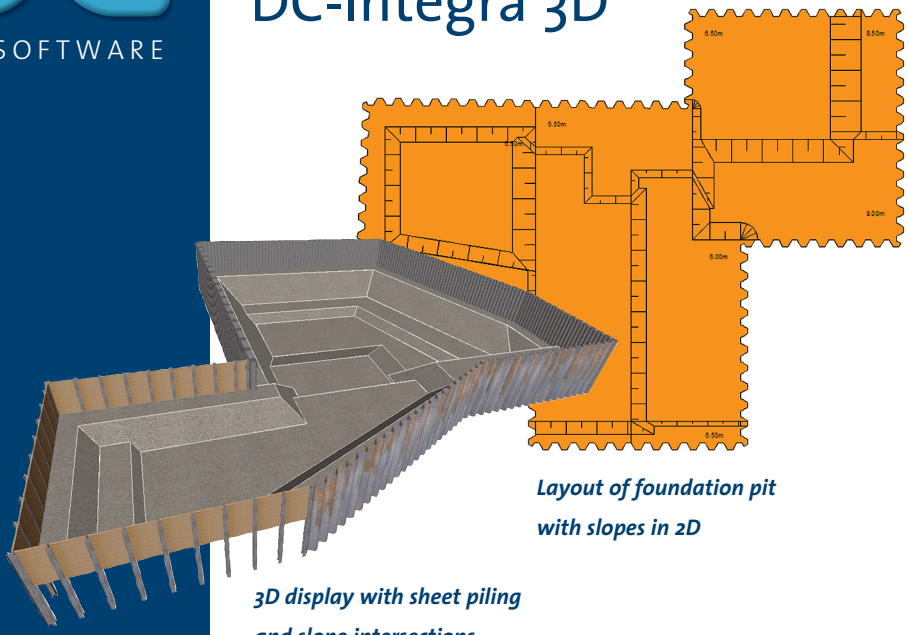
Assignment overview of the wall types



Link to the respective analysis program

DC-SOFTWARE

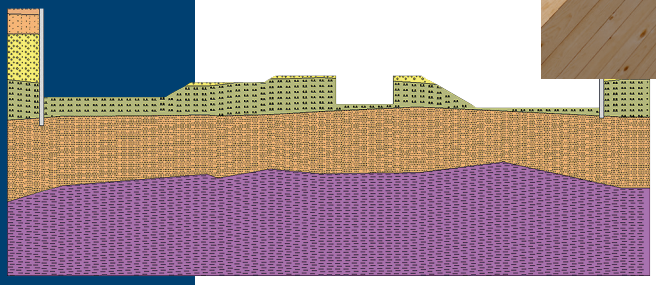
3D display of foundation pits
DC-Integra 3D



Layout of foundation pit with slopes in 2D

3D display with sheet piling and slope intersections

Display of a girder plank wall



Display of cross sections with soil layers

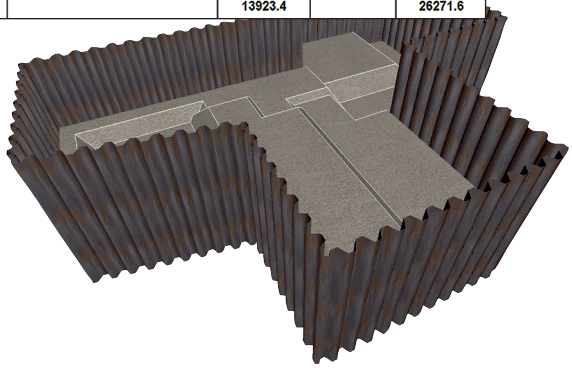
- Complete 3D model with automatic generation of the slopes between different depth sections
- Subdivision of the ground area with definition of the slope inclination
- Turning and shifting the 3D model with arbitrary viewing direction
- Creation of 3D images of complex foundation pit situations with photo-realistic display
- Clear overview over the geometry of the foundation pit even for non-experts
- Exact display of all types of walls with matching textures
- Steel, concrete, timber, earth
- Exact measures e.g. for sheet pile profiles from a parameter data base
- Import of DGMs, display of the ground surface – just easy

Excavation volumes and masses
DC-Integra 3D/Volume

- Calculation of the excavation volume at the push of a button, including swell factor
- Excavation masses with the specific weight of the soil
- Values per soil layer and total
- Verifiable output of the volume calculation with a list of all the coordinates

Determination of excavation volume and masses

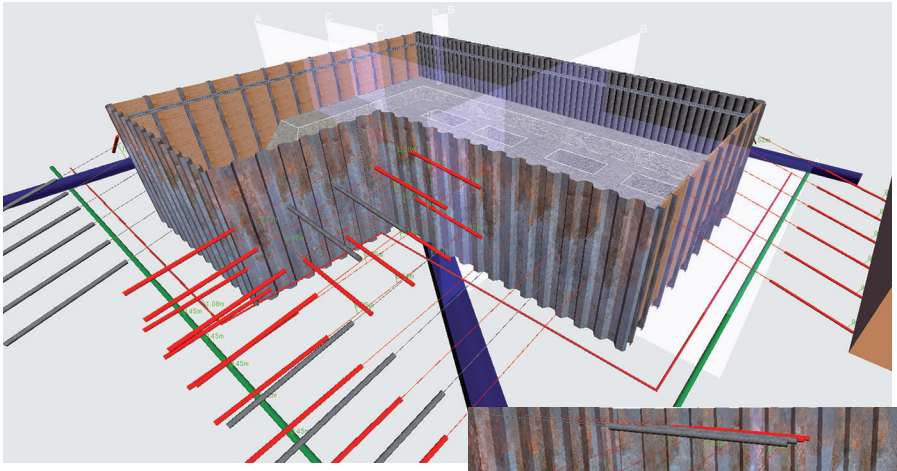
Cubage of excavation					
No.	Soil type	Layer name	Cubage [m³]	Spec.w.[kN/m³]	Excavation [t]
1		Sand, dense	2832.8	20.00	5665.7
2		Gravel, md	6804.3	18.00	12247.7
3		Silt (UM)	4286.3	19.50	8358.2
Total			**13923.4**		**26271.6**



3D model of the foundation pit

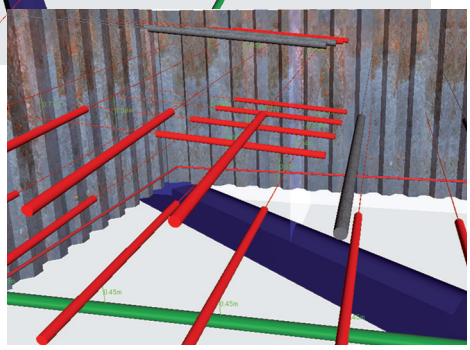
Collision check of anchors
DC-Integra 3D/Anchor

- Definition of anchor layers with boom at the foundation pit walls
- Depth, length, inclination of the anchors, length and diameter of the fixed length, boom profile
- Change of inclination and depth for single anchors
- 3D display of anchor layers and booms
- Turning and shifting of the display in the 3D view
- Easy check of the position of the anchors against each other
- Automatic check for collision between anchors (free/fixed length), between anchors and pipes, between anchors and buildings
- Permitted distances to fixed lengths/pipes/buildings may be defined



Display of the anchors in the 3D model, red = problematic points

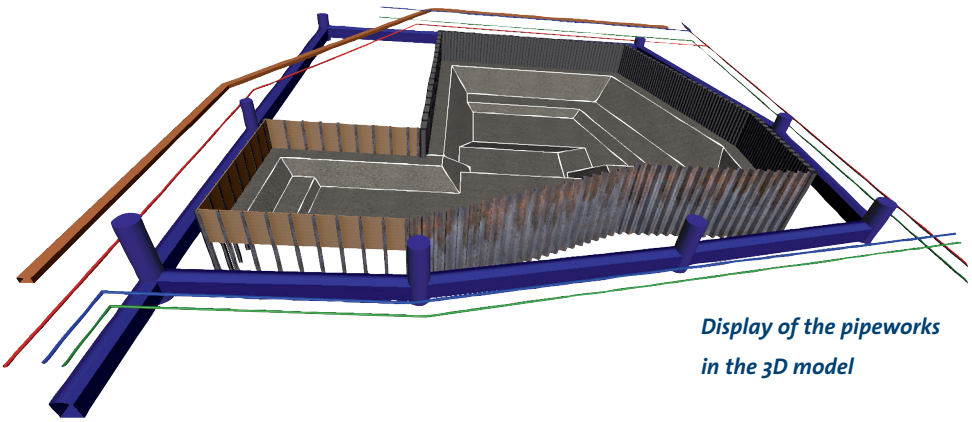
- Labels for the critical distances for a better overview
- Determination of the distances in the 3D model
- Anchors may be spreading (anchor pairs) and/or horizontally deviated



Position of the anchors from different points of view with collision check

3D display of all types of pipeworks
DC-Integra 3D/Pipeworks

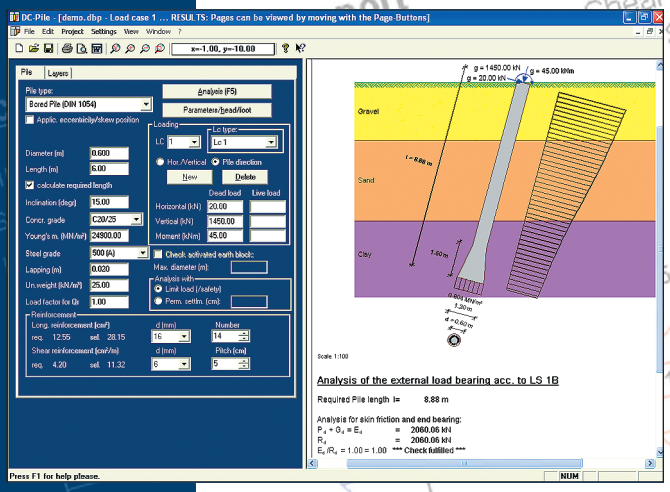
- Display of different types of pipeworks
- Wastewater, water, gas, electricity, district heat, cable trenches
- Select the color for each type
- Different sections: sewer pipe profiles, circular profiles, rectangular profiles
- Different dimensions of sewer pipe (egg-shaped) profiles may be defined arbitrarily
- Optionally connection of the pipes by pits
- Definition with coordinates or with inclination
- Reference to a reference height or with heights above sea level
- Overview of all the pipeworks by 3D display: rotate, enlarge and reduce arbitrarily



Display of the pipeworks in the 3D model

DC-SOFTWARE

Analysis of piles
DC-Pile



Input of the pile parameters and verification

Analysis of the external load bearing in Design Approach 2

Required Pile length l = 5.60 m

Analysis for skin friction and end bearing:
$P_d + G_d = E_d$ = 1199.12 kN
R_d = 1199.12 kN
E_d/R_d = 1.00 = 1.00 *** Check fulfilled ***

Acceptable skin friction:

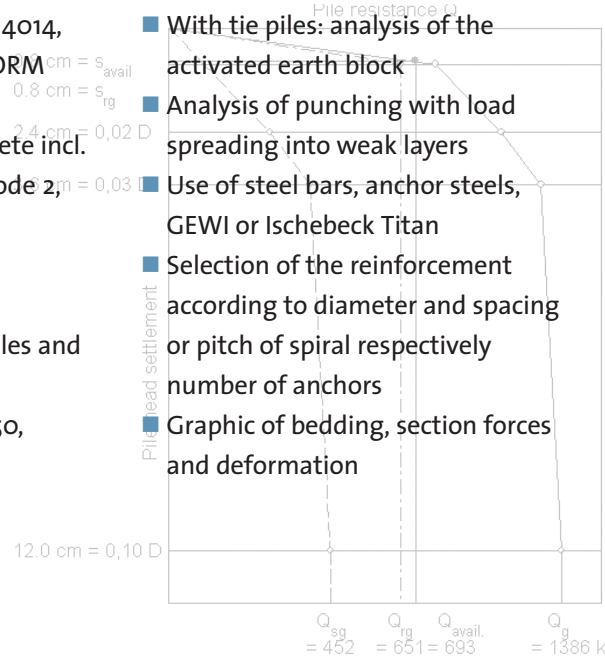
Layer	l [m]	avail.q_s [MN/m²]	Friction force Q_d [kN]
Kies	2.59	0.071	348.47
Sand	3.01	0.107	608.29
Acc. end bearing force S [kN]:			242.35
Sum = R_d			1199.12 kN

Avail. end bearing force avail.S = E_d - sum(Q_d) = 242.35 kN
Resulting end bearing = avail. S/A = 0.857 MN/m² = perm. end bearing = 0.857 MN/m²

Settlement from resistance settlement line: s = 0.654 cm

Determination of the external load bearing

- Bore piles, driven piles, grouted piles (micro piles) acc. to Eurocode 7, DIN 1054:2010, EN 1536, Rec. on piles, DIN 4014, DIN 4026, DIN 4128, OENORM B 4440, SIA 267, BS 8004
- Design of reinforced concrete incl. shear design acc. to Eurocode 2, DIN 1045-1, DIN 1045, OENORM B 4700, SIA 262, BS 8110, IS 456
- Steel design of girder profiles and pipes acc. to Eurocode 3, DIN 18 800, SIA 263, BS 5950, IS 800
- German, English, French, Italian, Portuguese, Romanian language
- Bearing or tie piles, vertical or inclined
- Optionally with foot widening
- Loads horizontal/vertical or in the direction of the pile in different load cases
- Layering of the subsoil with selection of $q_{b,k}$ and $q_{s,k}$ including suggestions
- Analysis of skin friction and eventually end bearing for vertical loads
- Elastic bedding to transfer H-loads, with automatic adaptation to the passive earth pressure
- Determination of the required pile length or safety with available length
- Optional determination of the settlement under a defined load or of the permissible load for predefined settlement
- Settlement for micro piles with the approach of Ischebeck
- Diagram of the settlement or heave vs. resistance
- With tie piles: analysis of the activated earth block
- Analysis of punching with load spreading into weak layers
- Use of steel bars, anchor steels, GEWI or Ischebeck Titan
- Selection of the reinforcement according to diameter and spacing or pitch of spiral respectively number of anchors
- Graphic of bedding, section forces and deformation



Analysis of settlement with improvement through stone columns

DC-Vibro

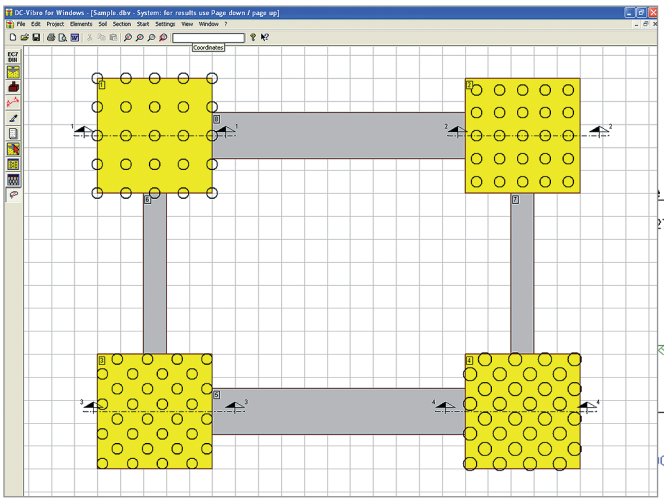
- Analysis of the soil improvement with the approach by Priebe, bearing capacity analysis acc. to Eurocode 7, DIN 1054:2010, DIN 4017:2006, SIA 267, OENORM B 4435-2
- German, English, French, Romanian language
- Any number of footings with individual soil layers for every analysis section
- Single, strip and circular footings as well as infinite load area
- Different load cases
- Variable soil layers with different column diameters
- Column parameters defined per layer, e.g. for mortar injected stone columns

Depth [m]	Foundation stress σ_F [kN/m²]	Superimposed stress from soil σ_0 [kN/m²]	Stress ratio Found./Soil	s without improvement for Foundation [mm]	s infinite load area with improv. [mm]	Factor footing [%]	Settlement of footing with improv. [mm]
0.50	275.00	9.50	28.95	0.00	0.00	100.00	0.00
1.50	190.85	28.50	6.70	9.88	5.95	89.17	5.31
2.50	129.18	47.50	2.72	19.13	7.04	76.63	5.40
3.00	112.42	57.00	1.97	7.51	3.52	67.06	2.36
4.00	88.71	66.00	1.34	12.43	6.60	58.06	3.83
5.00	71.47	75.00	0.95	7.95	11.96	31.50	3.77
5.50	64.39	79.50	0.81	3.39	5.98	26.00	1.55
6.50	52.62	91.00	0.58	1.94	4.22	36.00	1.52
7.00	47.72	96.75	0.49	0.83	2.11	30.13	0.64
8.00	39.55	108.25	0.37	1.45	9.17	100.00	1.45
9.00	33.11	119.75	0.28	1.20	9.17	100.00	1.20
10.00	27.99	131.25	0.21	1.01	9.17	100.00	1.01
11.00	23.90	142.75	0.17	0.86	9.17	100.00	0.86
Sum				67.60	84.04		28.90

Improvement of the settlement

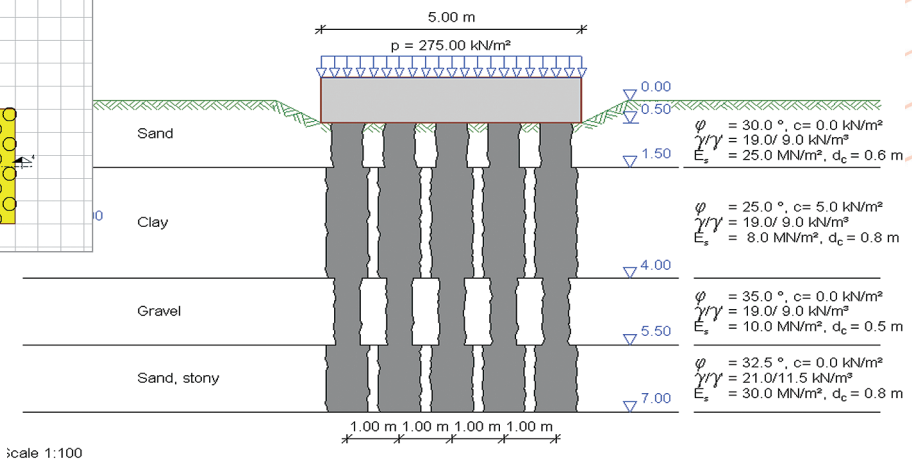
- Column arrangement in a triangular or rectangular grid with different distances
- Immediate display of the arrangement by preview function
- Calculation of the settlement with improvement, optionally comparison without improvement
- Calculation of the bearing capacity with and without improvement

- Fast editing of the parameters by jumping from the results to the input
- Clear display of results with section graphics
- Display of the stresses and settlements in a diagram



Top view of footings with column grid

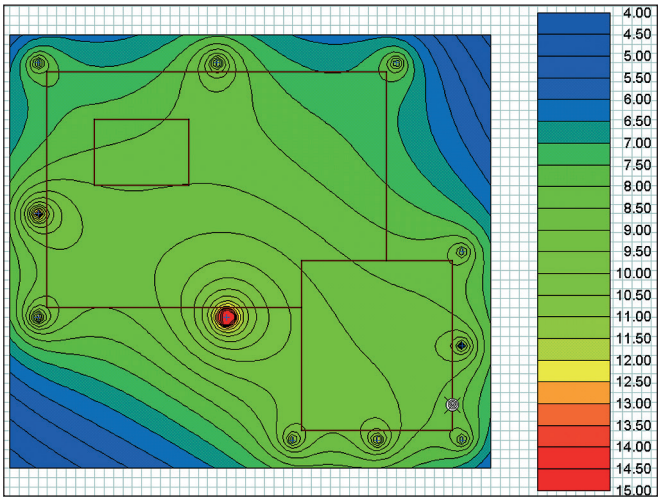
Section graphics with columns and soil layers



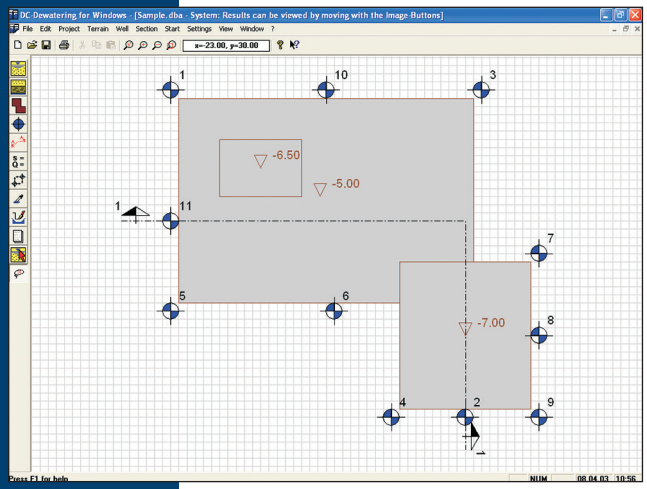
Scale 1:100

DC-SOFTWARE

Analysis of ground-water lowering
DC-Dewatering



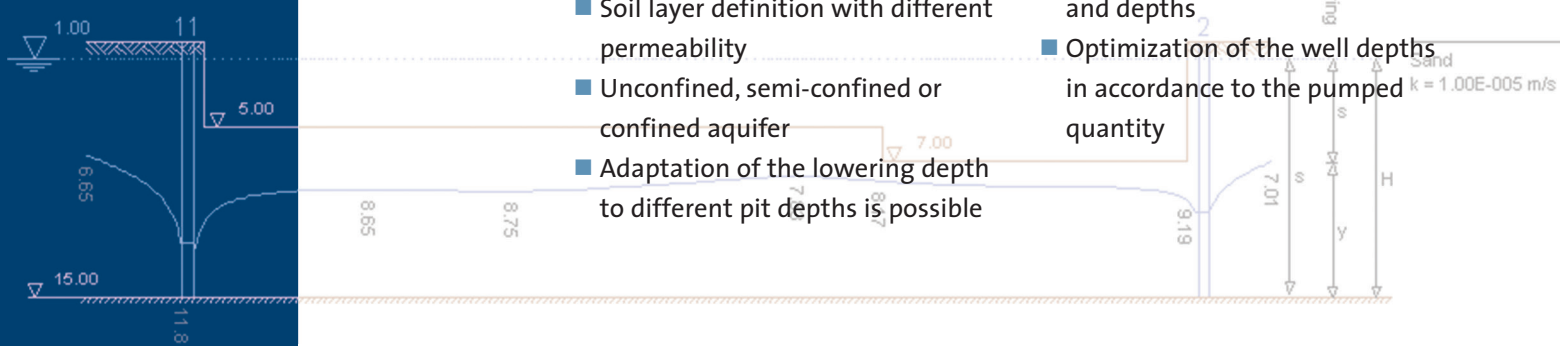
Graphic of the water level with color areas



Foundation pit sectors of different depth

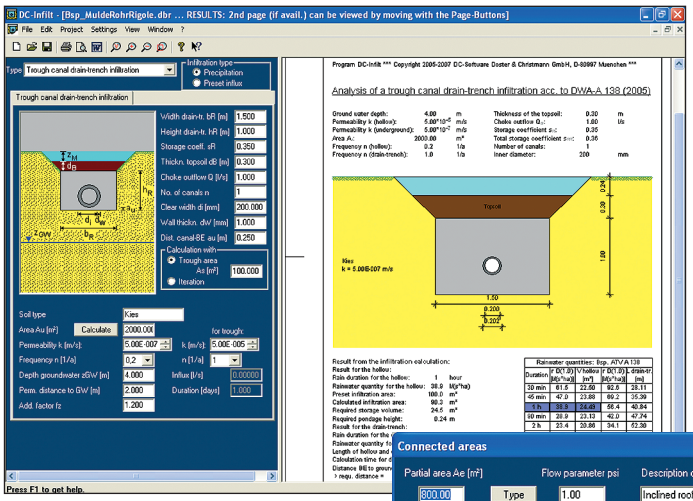
- Calculation with gravity or vacuum wells
- Analysis with required, predefined pump-water rate or single well quantities
- Improved formulae for the use of $Q > Q_{req}$
- Output of the capacity of all wells
- Calculation of the required number of wells
- Lowering and wetted filter height of the wells
- Consideration of the mutual influence
- Calculation of the range acc. to Sichardt, acc. to Weyrauch 2004 for large foundation pits or time-depending
- Waterproof enclosure, calculation of the trough construction method
- Residual water quantities from the wall and the base, inflow from precipitation
- Graphic of the lowering with elevation lines or color areas
- Determination of the critical point
- Free section draw with water-level course
- Interactive display of the lowering at any point
- **Optimization:** distribution of the wells with arbitrary pit shapes and depths
- Optimization of the well depths in accordance to the pumped quantity

- German, English, French, Romanian language
- Arbitrary number and shape of the pits, with different depths
- Free number, diameter and position of wells, several series are possible
- Soil layer definition with different permeability
- Unconfined, semi-confined or confined aquifer
- Adaptation of the lowering depth to different pit depths is possible

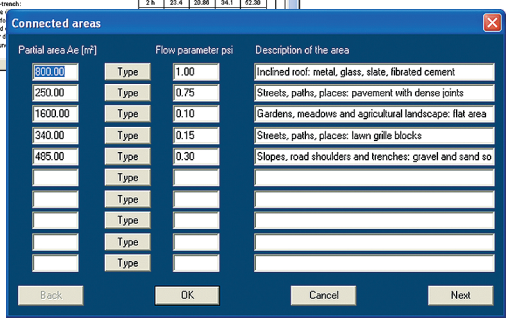


Analysis of infiltrations
DC-Infilt

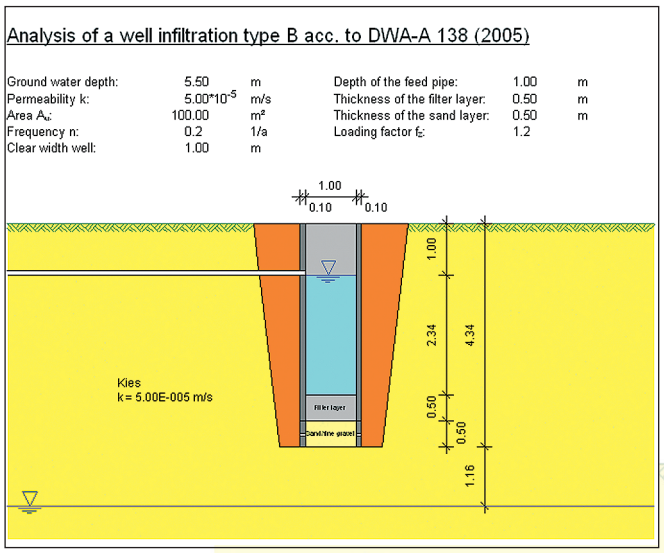
- Analysis of infiltration constructions acc. to DWA-A 138, OENORM B 2506-1 and Herth/Arndts
- German, English, French language
- Area infiltration
- Trough infiltration
- Drain-trench infiltration
- Canal drain-trench infiltration
- Trough drain-trench infiltration
- Trough canal drain-trench infiltration
- Well infiltration type A/B acc. to ATV



Trough canal drain-trench infiltration



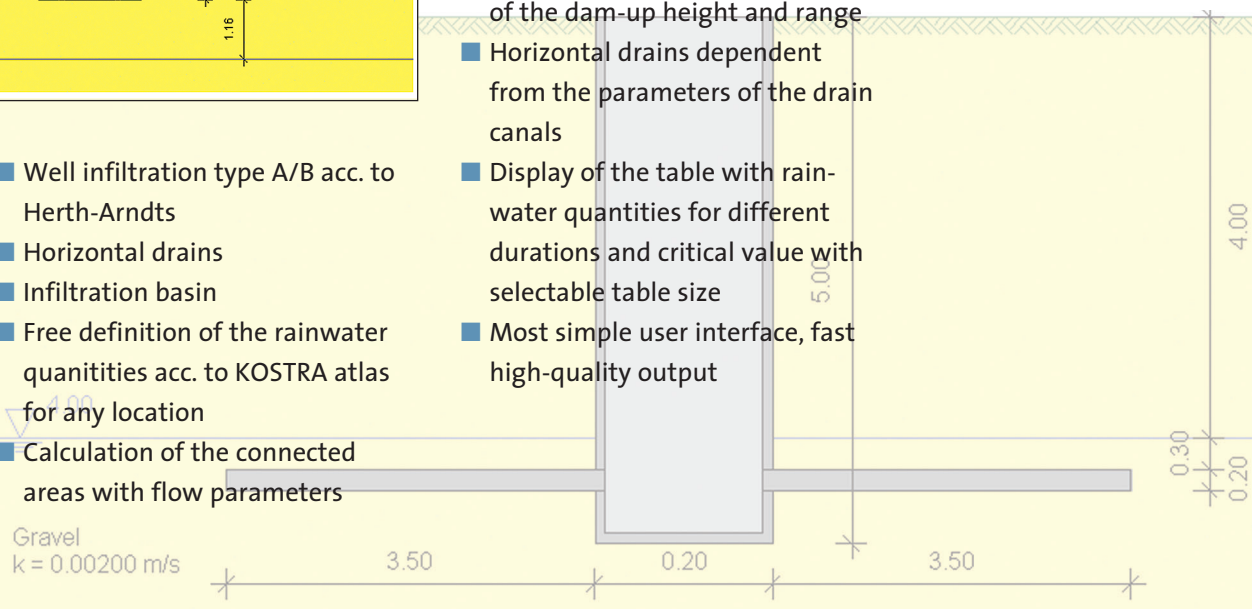
Calculation of partial areas



Well infiltration

- Alternatively analysis of the infiltration of given influx quantities
- Automatic optimization of drain-trench lengths and trough areas
- Well infiltration with calculation of the dam-up height and range
- Horizontal drains dependent from the parameters of the drain canals
- Display of the table with rainwater quantities for different durations and critical value with selectable table size
- Most simple user interface, fast high-quality output

- Well infiltration type A/B acc. to Herth-Arndts
- Horizontal drains
- Infiltration basin
- Free definition of the rainwater quanitities acc. to KOSTRA atlas for any location
- Calculation of the connected areas with flow parameters



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- PST Spezialtiefbau GmbH
- Franki Grundbau GmbH & Co. KG
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- TU Wien, HTL Linz, HTL Krems

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- Implenia Bau AG
- Sieber Cassina + P. AG

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Italy
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- Tecnoplan, Brixen

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DC-Software
Doster & Christmann GmbH
Hannah-Arendt-Weg 3
D-80997 München
Tel.: +49-89-89 60 48 33
Fax: +49-89-89 60 48 18
e-mail:service@dc-software.com
Internet: www.dc-software.com