

DredgerNaut

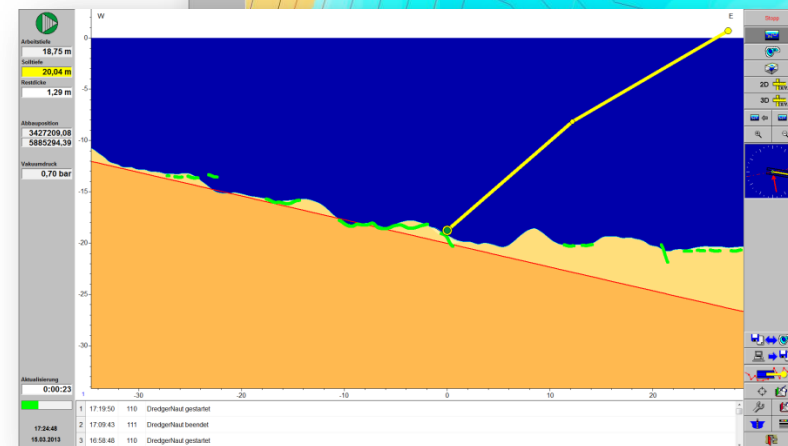
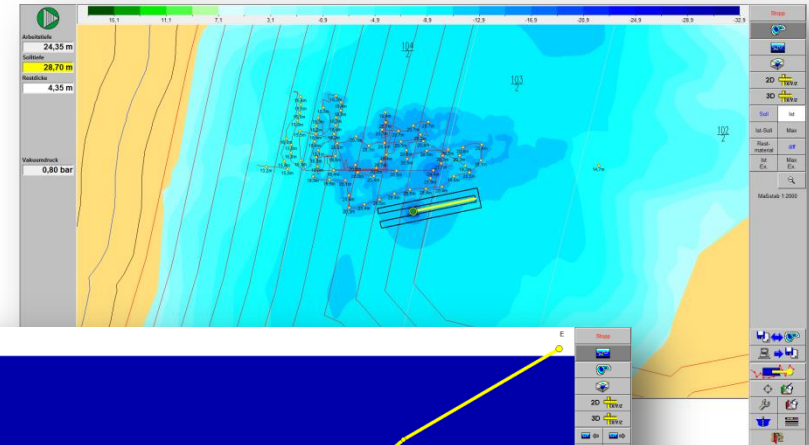


Instructions for use

Operate • document • measure

Version: 10-5-1

Status: 23/06/16



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1 Introduction

DredgerNaut is a measuring and visualization system for the positioning of excavation devices and the continuous documentation of mining operations in sand and gravel mines.

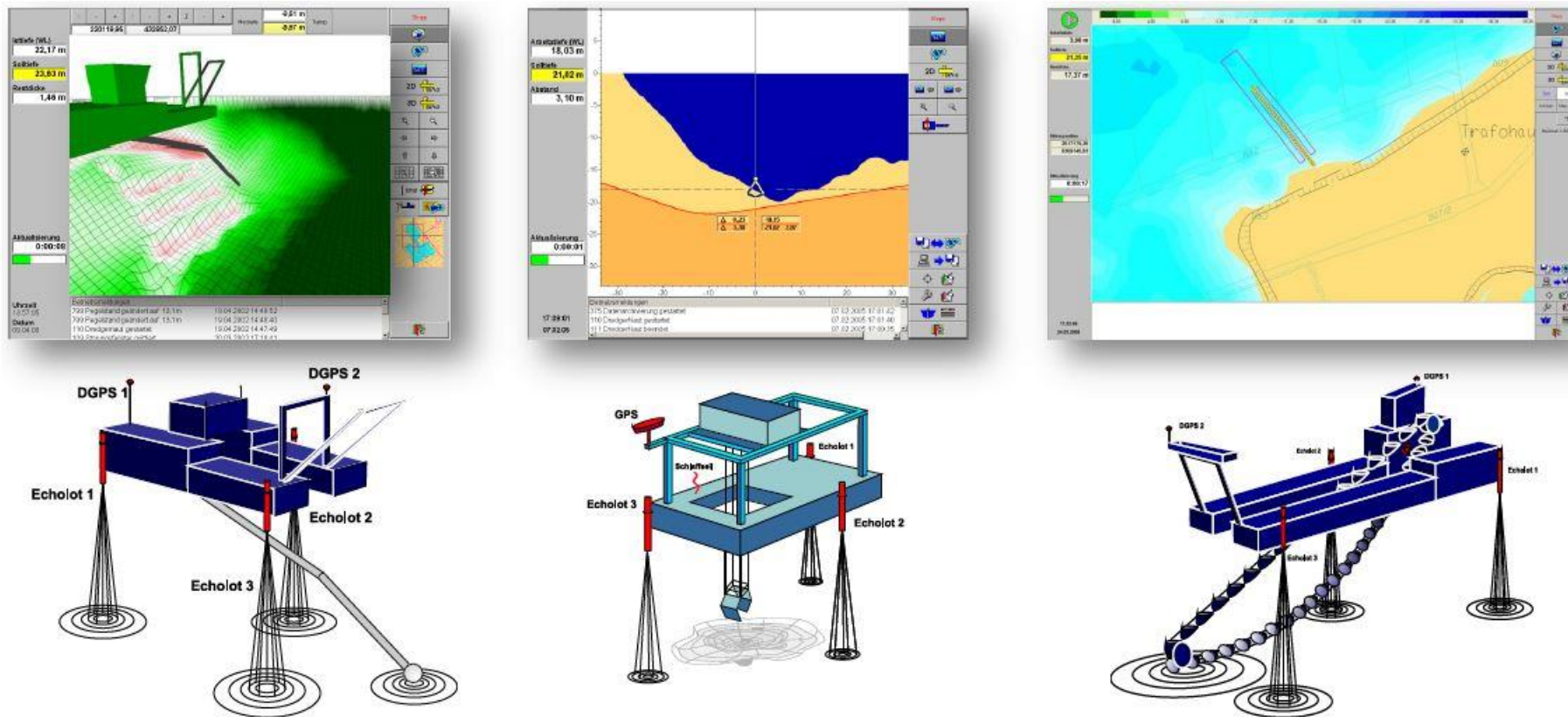


Figure 1-1: Excavation devices

2 DredgerNaut Manager

The **DredgerNaut Manager** is used for the administration and organization of these data on the Central Station. With the **DredgerNaut Manager** it is possible to administer different excavation sites, transfer and activate archive-data, prepare Copies (planning-data) and merge data sets (*Insert*).

Main operations



Start



Transfer and activate, if applicable

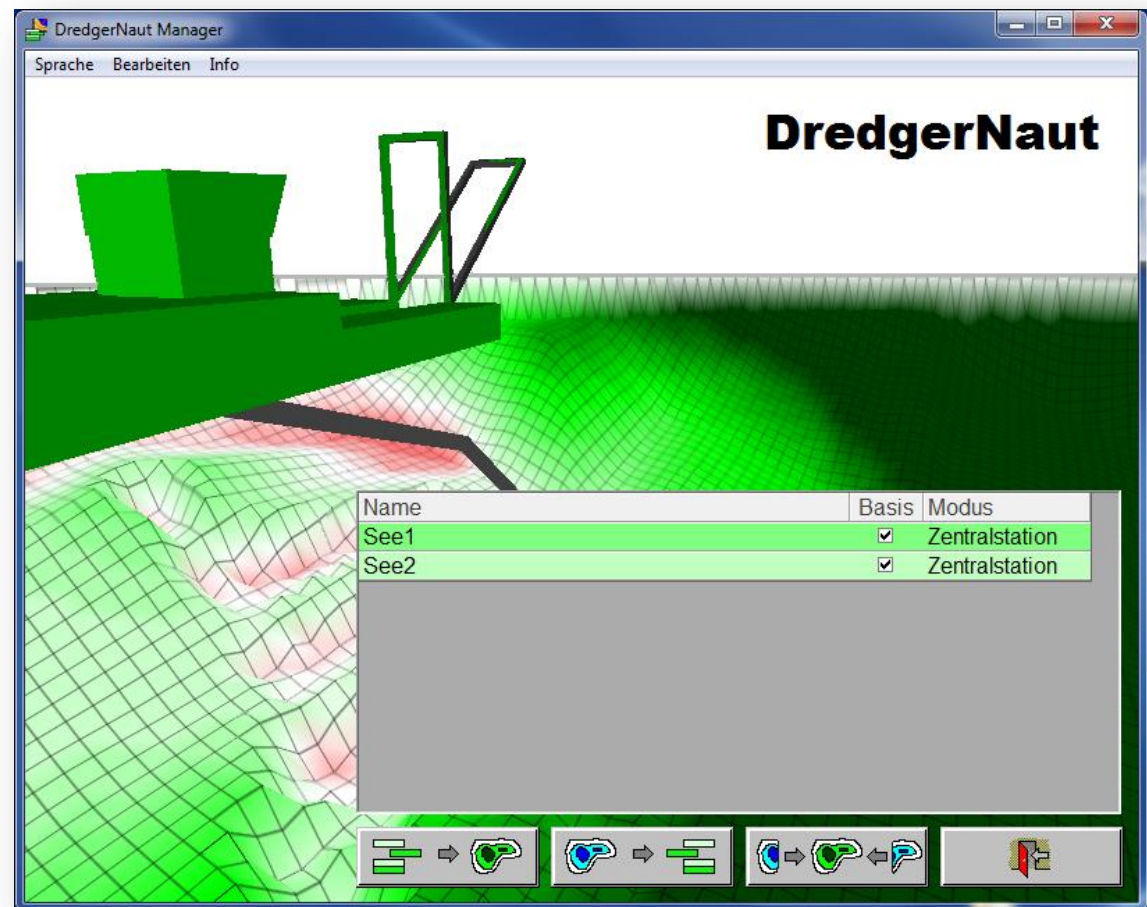


Insert

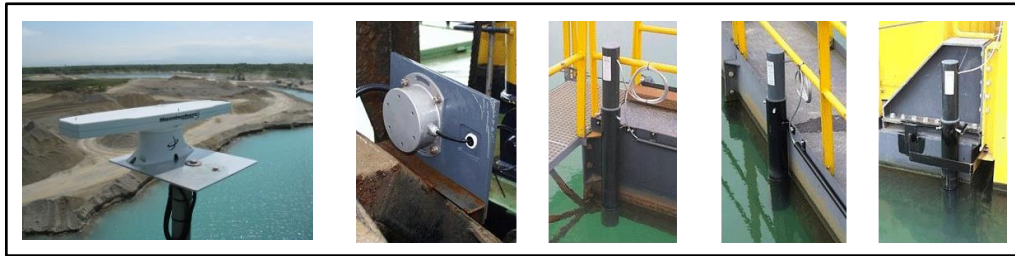


Exit

For detailed information consult the **DredgerNaut Manager** manual.



3 Measuring data acquisition MDE



MDE

Anzeige					Ausgang				
Sensor	X	Y	Z	FI	Sensor	X	Y	Z	FI
Echolot 1	17,60				Echolot 1	-317,47	451,92	-17,95	1 / 1
Echolot 2	17,30				Echolot 2	-317,54	442,41	-17,35	1 / 1
Echolot 3	17,80				Echolot 3	-330,77	439,54	-18,15	1 / 1
Echolot 4	17,40				Echolot 4	-337,09	424,73	-17,05	1 / 1
DGPS 1	6.33233978	51.98078989	Qualität 2	1 / 1	Sauger/Aufhangung	-315,48	449,03	0,50	1 / 1
DGPS 2	6.33229682	51.98076507	Qualität 2	1 / 1	Saugrohkopf	-343,03	425,17	-1,51	1 / 1
Kompass 1					rechweis. Kurs	227,29			1
Kompass 2					Saugrohrwinkel 1	-2,00			1
Lagegeber 1	273,00			1	Saugrohrwinkel 2	8,40			1
Lagegeber 2	260,00			1	Saugrohrwinkel 3				
Lagegeber 3					Saugrohrwinkelung				3,58
Winkelgeber 1	6000,00			1	Jetleistung				
AW 1	3,00			1	Saugleistung				
AW 2	50,00			1	Druckfluss				
AW 3	6000,00			1	Saugrohrtiefe 1				
AW 4	50,00			1	Saugrohrtiefe 2				
Pegelstand			13,15		Saugrohrtiefe 3				
Vakuumdruck	0,23			1	Vakuumdruck	0,17			1
Leistung Saugs.	197,21			0	v [m/s]	0,00			1
Leistung Jelp.	0,00			0	Offset TUS	1000,00			0
Fließgeschw.	0,00			0	Wasserslinie	0,65			1
Durchfluß	0,00			0	Zeitstempel	15.11.05	12:38:02		1
Tiefe Rohr 1	23,06			0					
Tiefe Rohr 2	11,45			0					
Tiefe Rohr 3	0,00			0					
Verholten	0,00			0					
Boosterpumpe	184,67			0					

auto Verholten
 VL 0,00 m VR 0,00 m DC Betrieb
 HL 0,00 m HR 0,00 m DC-Freigabe
 MDE - Modus

DredgerNaut

Abbauposition: 3427209,91
 5885310,64
 Vakuumdruck: 0,50 bar
 Abtauchung: 0:00:31
 1 15:51:37 799 Pegelstand geändert auf 7,21m
 2 15:51:28 374 Das Datenarchiv HENK_Sauger_2013-09-02_15-51 wurde erstellt
 3 15:51:15 375 Datenarchivierung gestartet

The measuring data acquisition program **MDE** (German: **Messdatenerfassung**) is the interface between the sensors and the visualization program **DredgerNaut**. The **MDE** continually reads the measuring data from the sensors (DGPS-receiver, echo sounders and inclinometers) and does the preprocessing. Additionally, the **MDE** acts as the interface between the control system of the excavation device and **DredgerNaut**.

When the measuring data acquisition program (MDE) is not running, the DredgerNaut system will not receive any sensor data and change to a FAULT-status.

1 Raw data

	Y	Z	FI
Echolot 1		17,60	1
Echolot 2		17,30	1
Echolot 3		17,80	1
Echolot 4		17,40	1
DGPS 1	6,33233978	51,88078898	Qualität: 2 1 / 1
DGPS 2	6,33229682	51,88076507	Qualität: 2 1 / 1
Kompass 1			
Kompass 2			
Lagegeber 1	273,00		1
Lagegeber 2	260,00		1
Lagegeber 3			
Winkelgeber 1	6000,00		1
AW 1	3,00		1
AW 2	50,00		1
AW 3	6000,00		1
AW 4	50,00		1
Pegelstand		13,15	
Vakuumdruck	0,23		1
Leistung Saugp.	187,21		0
Leistung Jetp.	0,00		0
Fließgeschw.	0,00		0
Durchfluß	0,00		0
Tiefe Rohr 1	29,06		0
Tiefe Rohr 2	11,45		0
Tiefe Rohr 3	0,00		0
Verholen	0,00		0
Boosterpumpe	184,67		0

2 Local coordinates

Ausgang	X	Y	Z	FI
Echolot 1	-317,47	451,92	-17,95	1 / 1
Echolot 2	-317,54	442,41	-17,35	1 / 1
Echolot 3	-330,77	439,64	-18,15	1 / 1
Echolot 4	-337,09	424,73	-17,05	1 / 1
Saugr.-Aufhängung	-315,48	449,03	0,50	1 / 1
Saugrohrkopf	-343,03	425,17	-1,51	1 / 1
rechtweis. Kurs	227,29			1
Saugrohrwinkel 1	-2,00			1
Saugrohrwinkel 2	8,40			1
Saugrohrwinkel 3				
Saugrohrauslenkung	3,58			1
Jetleistung				
Saugleistung				
Druchfluss				
Saugrohrtiefe 1				
Saugrohrtiefe 2				
Saugrohrtiefe 3				
Vakuumdruck	0,17			1
v [m/s]	0,00			1
Offset TuS	1000,00			0
Wasserlinie	0,65			1
Zeitstempel	15.11.05	12:38:02		1

Meaning of the status indicators:

- 2: The sensor does not transmit any data/is off or not present
- 0: The sensor is transmitting data, but the values are not usable/plausible.
- 1 The sensor transmits correct values.

The DGPS-receiverer shows a two-part status indicator:

- 2/-2: No reception or the sensor is off or not present.
- 3/0: Correctional signal is not received.
- 4/0: Data-set is corrupted.
- 1/1: GPS- and correctional signal okay.

The configuration of the measuring data acquisition program differs from system to system and type of excavation device (suction dredger, bucket chain- or grab dredger).

4 Graphical user interface

The screenshot displays the DredgerNaut software interface. At the top, a color-coded depth scale ranges from 9.89 to -30.11. The main area shows a bathymetric map with contour lines and a yellow excavation device overlaid. The left sidebar contains an information panel with the following data:

- Arbeitstiefe: 17,91 m
- Solltiefe: 19,38 m
- Restdicke: 1,47 m
- Abbauposition: 3427209,91 / 5885310,64
- Vakuumpdruck: 0,50 bar
- Aktualisierung: 0:00:31

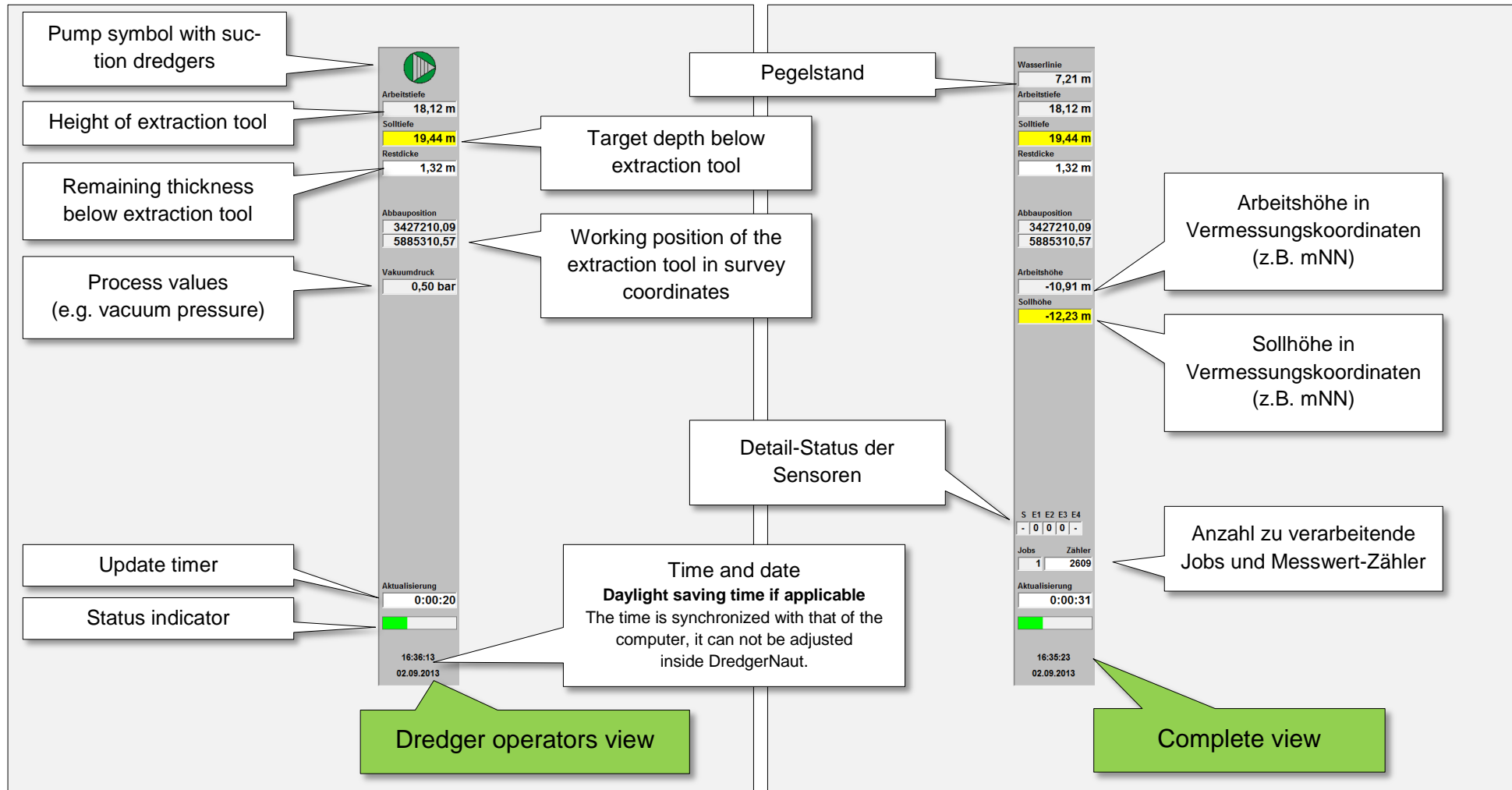
The bottom of the interface features a message panel with the following log entries:

1	15:51:37	799	Pegelstand geändert auf 7,21m
2	15:51:26	374	Das Datenarchiv HENK-Sauger_2013-09-02_15-51 wurde erstellt.
3	15:51:15	375	Datenarchivierung gestartet

Callouts identify the following UI elements:

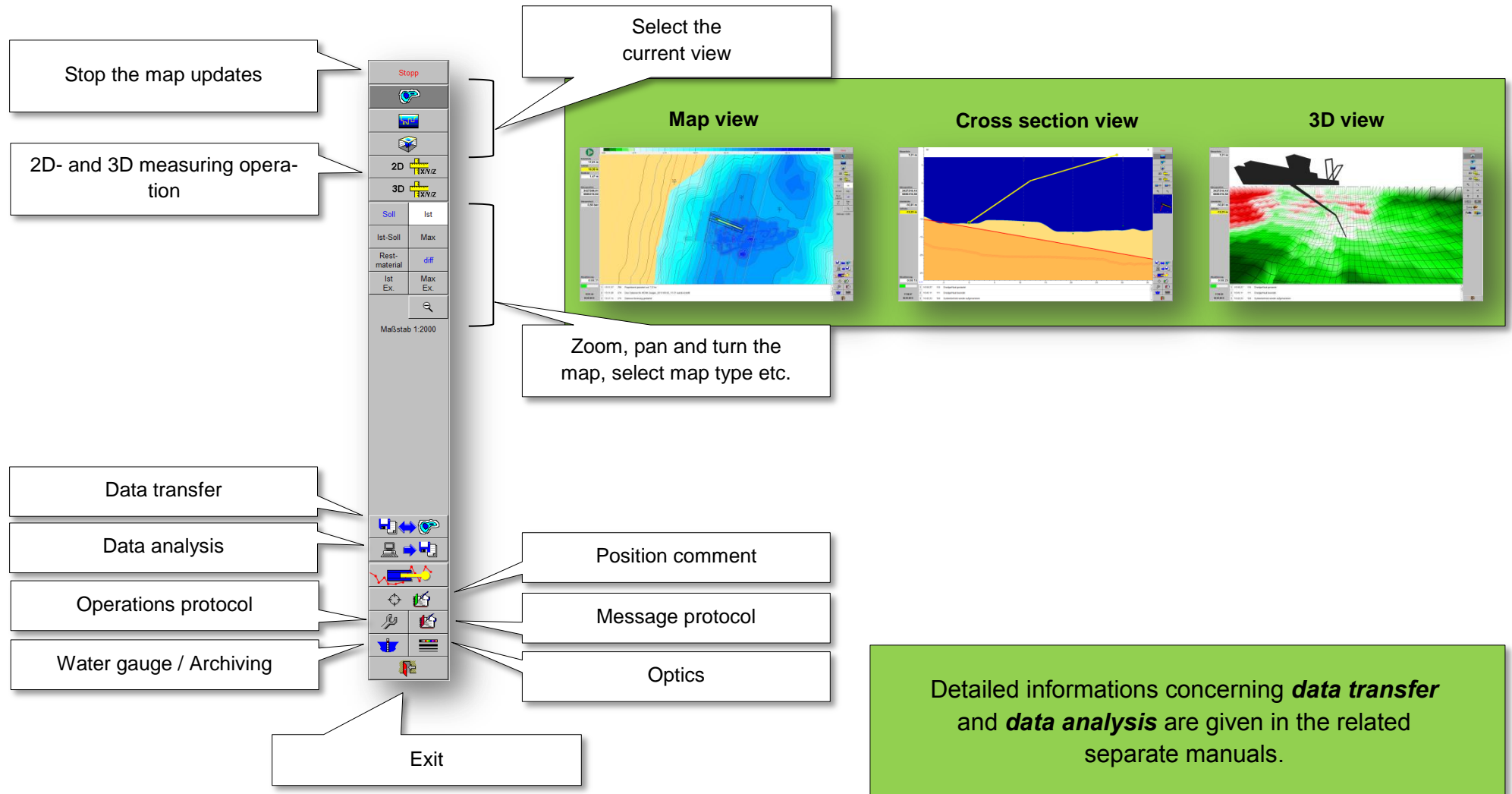
- Legend in map view (top center)
- Presentation of excavation device (left side)
- Information panel (left sidebar)
- Control panel (right sidebar)
- Message panel (bottom)

4.1 Information panel



The information panel has got several configurations.

4.2 Menu structure



5 Start of program

5.1 Setting the actual water gauge

During the start of program setting the actual water gauge value will be requested in regular intervals. Depending on the frequency of fluctuations this may be necessary up to daily.

Betriebeinstellungen

Pegelstand
15.03.2013 11:34
aktuell

Anwender
TEAM
Administrator

Tagesprotokoll
Beginn des Betriebes
Materialzeit
max. Arbeitstiefe

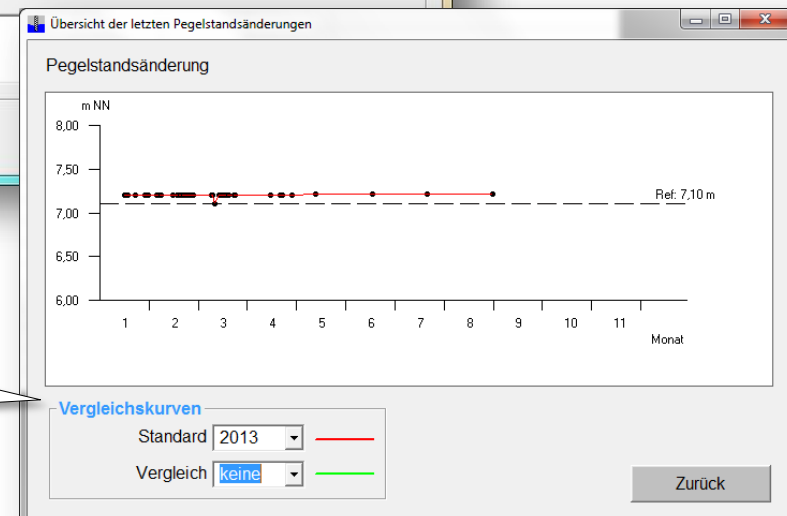
Archivierung / Datenstand
Jetzt archivieren Abbrechen
letzte Archivierung am: 13.03.2013
Datenstand: 11:41:08 / 15.03.2013

Kommentar

Übernehmen

Daylight saving time, if applicable
The time is synchronized with that of the computer, it can not be adjusted inside DredgerNaut.

The water gauge values are recorded in the **operations protocol**.



5.2 Archiving

1 During start of the program data backups (archives) are generated in regular intervals.

2

3 The archiving interval is adjustable. These settings are protected by password. Archives can automatically be deleted periodically. This offers high data security by frequent archiving while at the same time ensuring organization of the needed data volume.

Betriebs-einstellungen

Pegelstand
15.03.2013 11:34 m
aktuell m

Anwender

Administrator

Tagesprotokoll
Beginn des Betriebes
Materialzeit

Archivierung / Datenstand
Jetzt archivieren
letzte Archivierung am: 13.03.2013
Datenstand: 11:41:08 / 15.03.2013

Archivierung

Archive automatisch erstellen
Archivierungszyklus: Tage

Archive automatisch löschen
 nein ja wenn Speicherplatz kleiner als GByte

Ein Archiv pro Woche, ab Woche(n)
 Ein Archiv pro Monat, ab Monat(e)
 Ein Archiv pro Jahr, ab Jahr(e)

Letztes Archiv einer Periode wird nicht gelöscht

Datenarchivierung
Ziel-Auswahl für das Sicherungsarchiv
 lokale Sicherung
Typ
 Standard Komplett
Archiverstellung wird in 28 Sekunden automatisch gestartet.

1

During **online operation** the data status will usually be *newer* than the last archive.

2

During **offline operation** the date of the archive and the date of the data status will usually be the *same (basis data)*. The date of the archive is the date it was created on the online system

2

3

When creating an archive from a **data-copy** during **offline-operation** the date of the archive will not be changed (using the **DredgerNaut Manager**). The date of the archive is the date of the creation on the online system (excavation device). If the data status of the copy is altered (e.g. by deleting existing or importing new data) the date of the data status will then be newer than the date of the archive.

5.3 Login

If the operations protocol is used employee related, the employees have to login at the start of their shift and logout again at the end.

1 Login form

2 Login time

3 Logout time

Anmeldung

Anwender: BAGGER
Kennwort: BERND

Betriebs-einstellungen

Pegelstand: 02.09.2013 18:14 m
aktuell m

Archivierung / Datenstand: Jetzt archivieren Anpassen
letzte Archivierung am: 02.09.2013
Datenstand: 18:14:02 / 02.09.2013

Arbeits-schichten

Anwender: BERND
Kommentar:

Login Logout

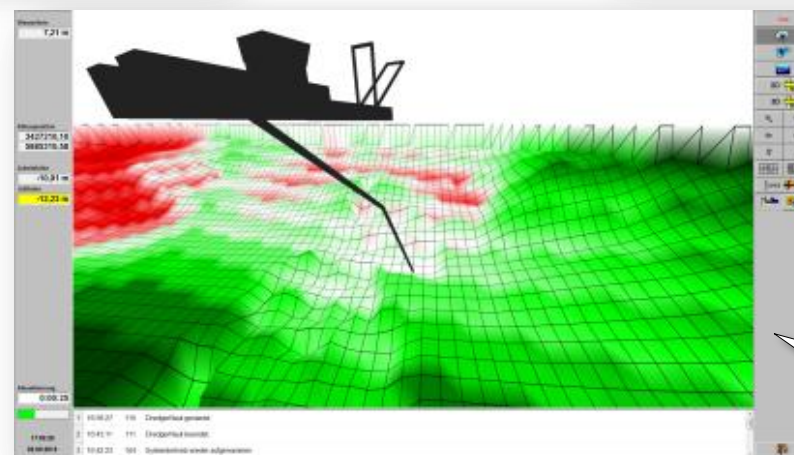
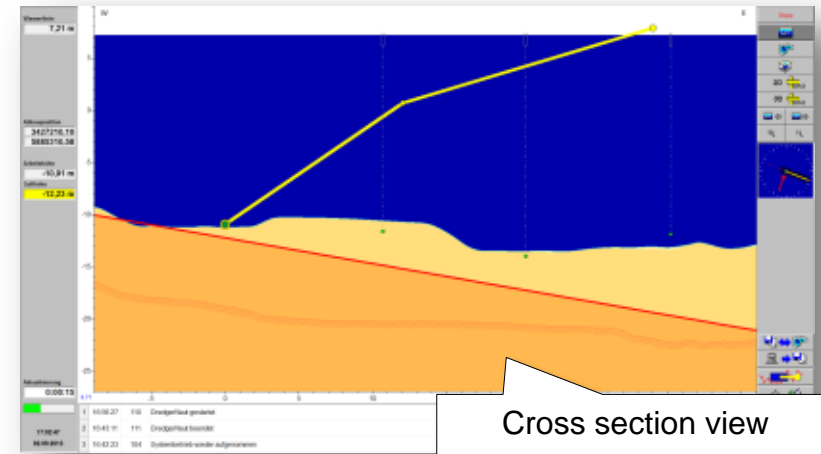
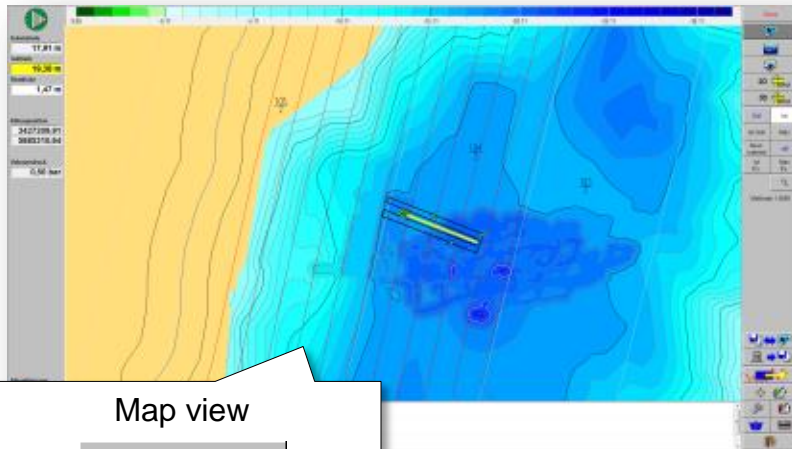
Nr	Anwender	Login	Logout	Beginn	Ende	Kommentar
1	BERND	07:11	18:13	07:11	18:13	

Speichern Schliessen

6 Excavation operation

During excavation operation the excavation device can be presented in one of three views, **map view**, **cross section view** or **3D view**.

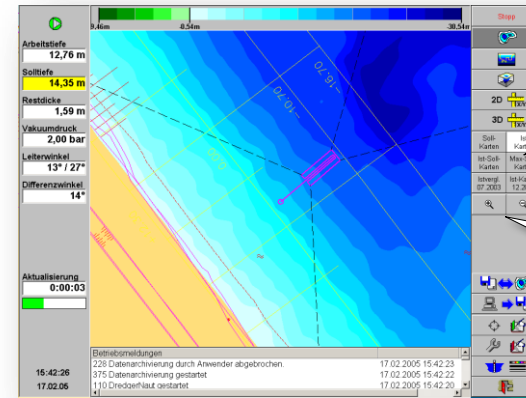
The 3D view is only available with suction dredgers.



6.1 Map types

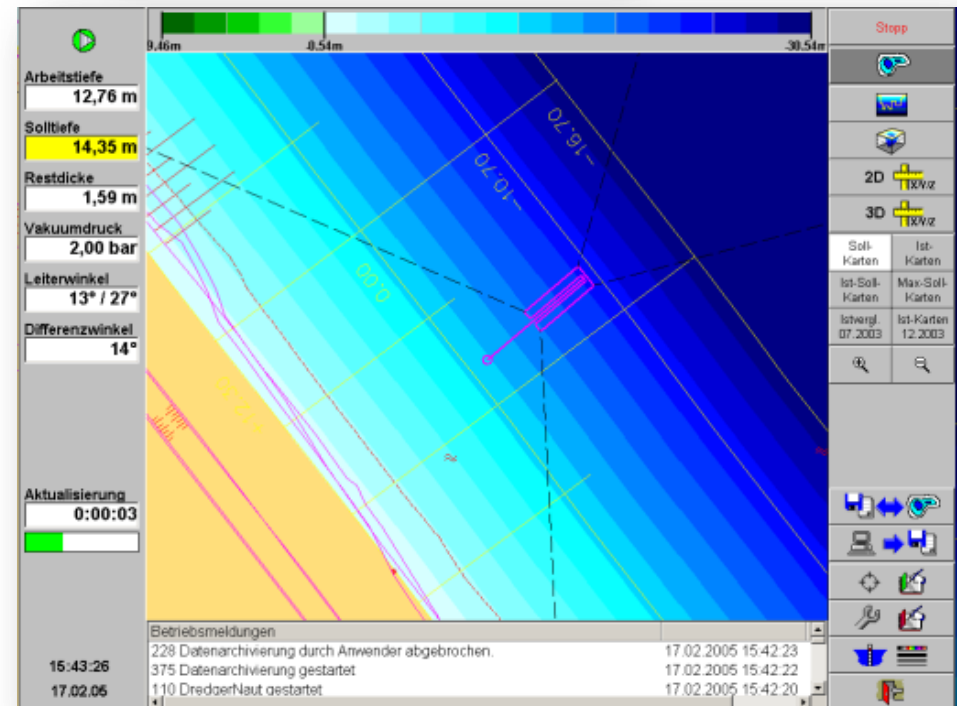
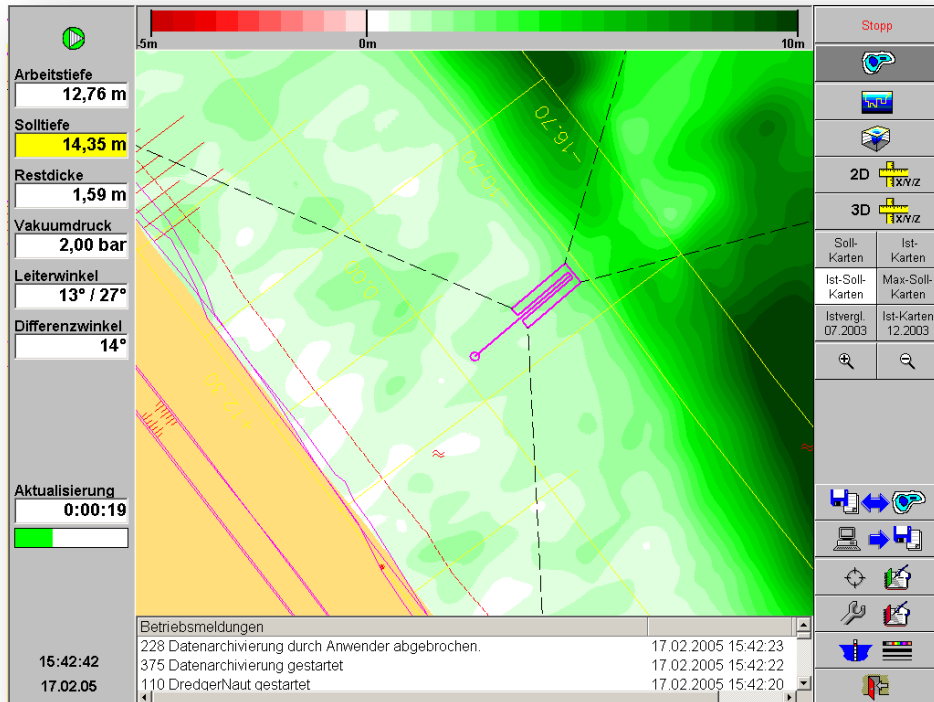
By default the following map types are available:

- Target profile
- Actual profile
- Difference profile(s)
- Max. depth map(s)



Switch map type

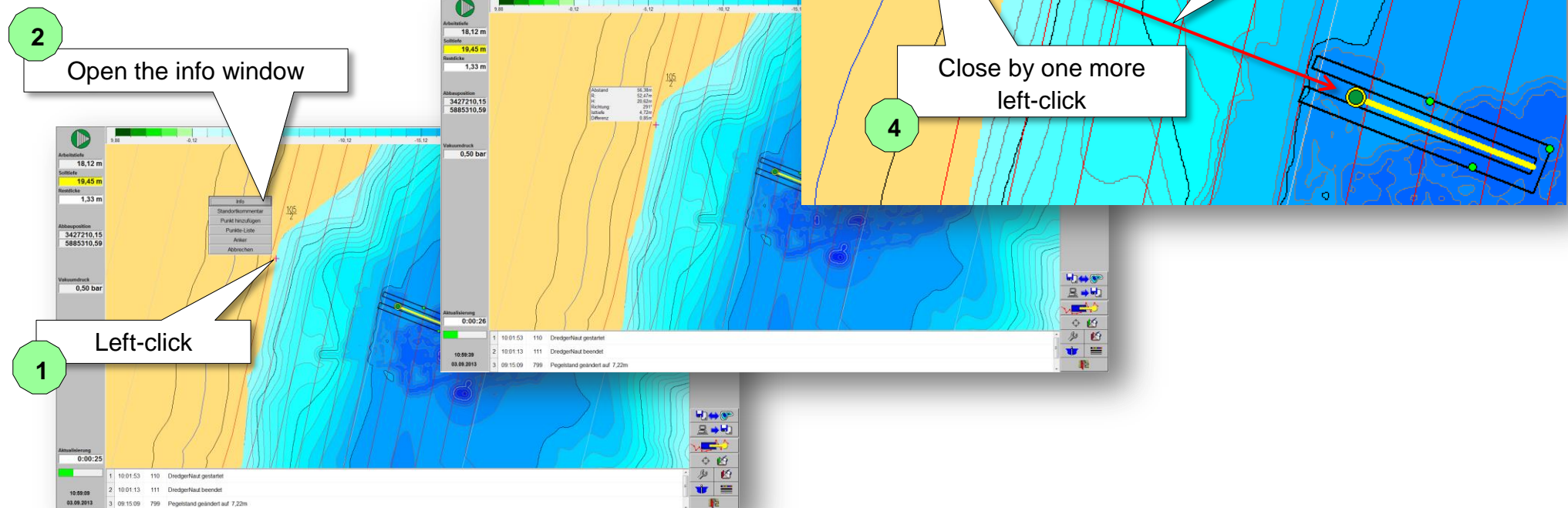
Zoom in (larger) or out (smaller)



6.1.1 Info window

By a left-click onto the map a pulldown menu appears. Clicking on 'info' shows a window containing information for the clicked position and the distance from there to the extraction tool. Close the info window by clicking into it.

Clicking onto another position of the map while the info window is still open will move the window over there and show informations for the new position

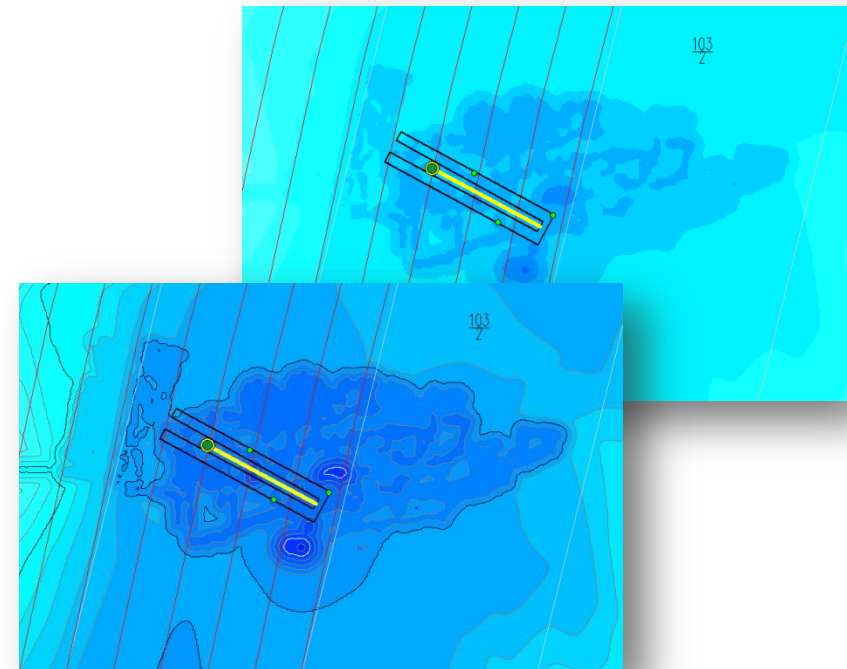
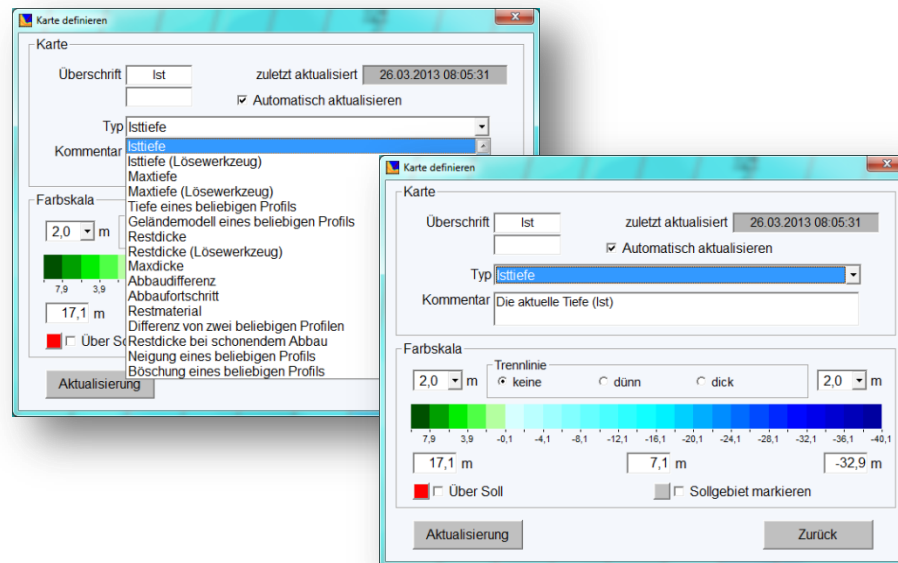


6.1.2 Map type configuration

Double-clicking a map type button will show the configuration window for that map. The colour scale, depth gradient and separating lines for the map can be defined here. The contrast can be increased here and the resolution enlarged.

Besides the default map types (Target-, Actual-, Difference- and Max-profile) additional map types can be defined.

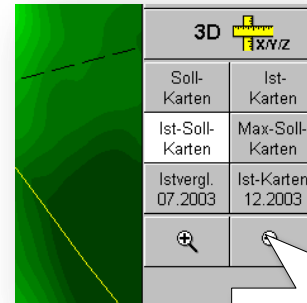
- *Depth of the extraction tool (Actual- and Max.-depth as well as remaining thickness) independent from the echo sounders*
- *Excavation progress*
- *Inclination (in degrees) or slope-profiles (in 1 by x)*
- *...and much more.*



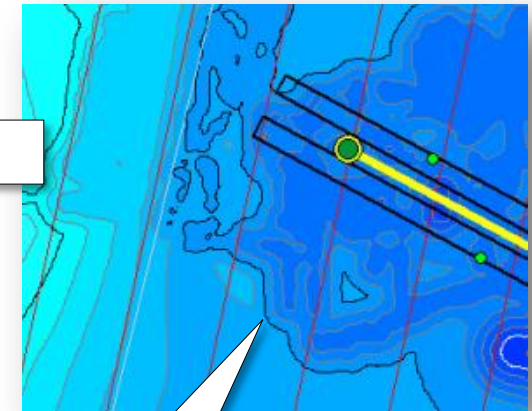
The scope of four buttons for the default map types

- *Target-profile,*
- *Actual-profile,*
- *Actual-Target- and*
- *Max-Target-profile*

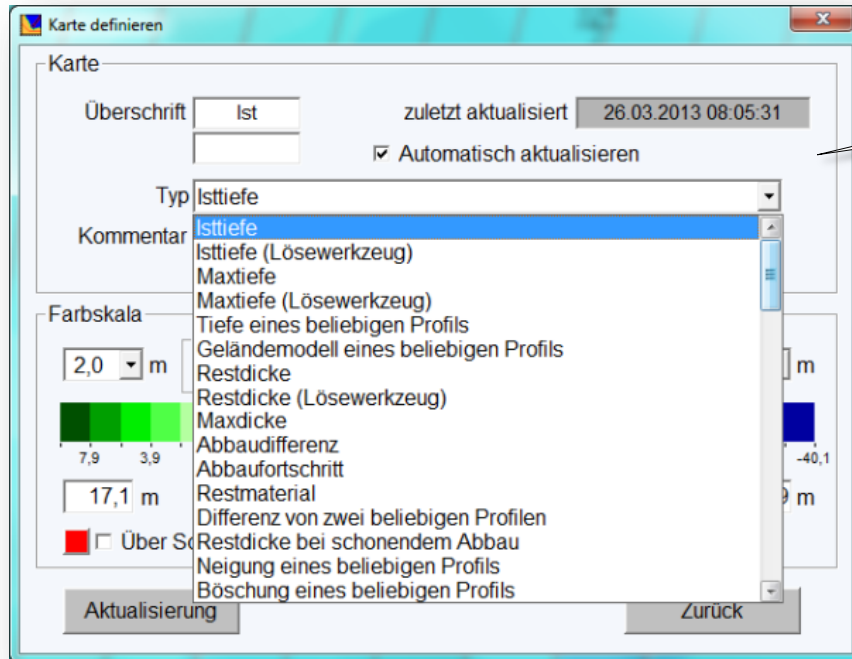
can be extended by additional buttons.



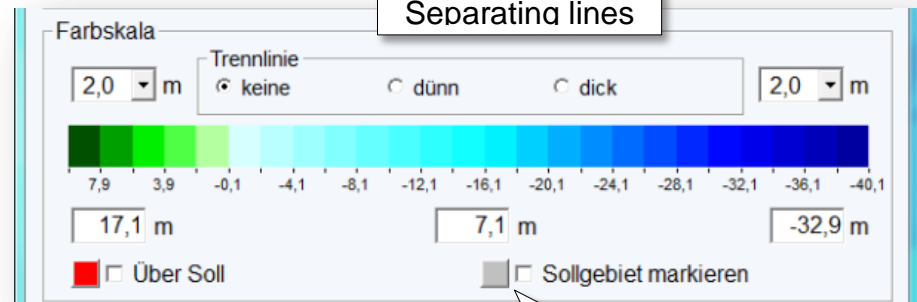
Additional map types






















After selecting the new map type the colour scale will be defined.



Separating lines

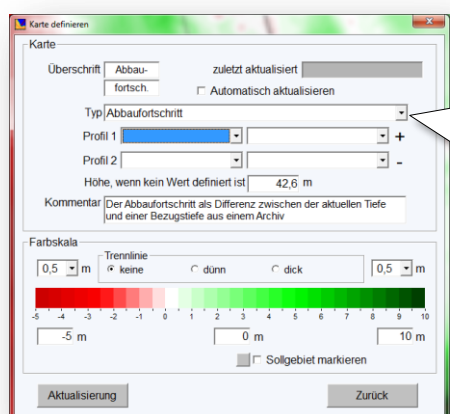


In each map the target area can be marked by its own colour.

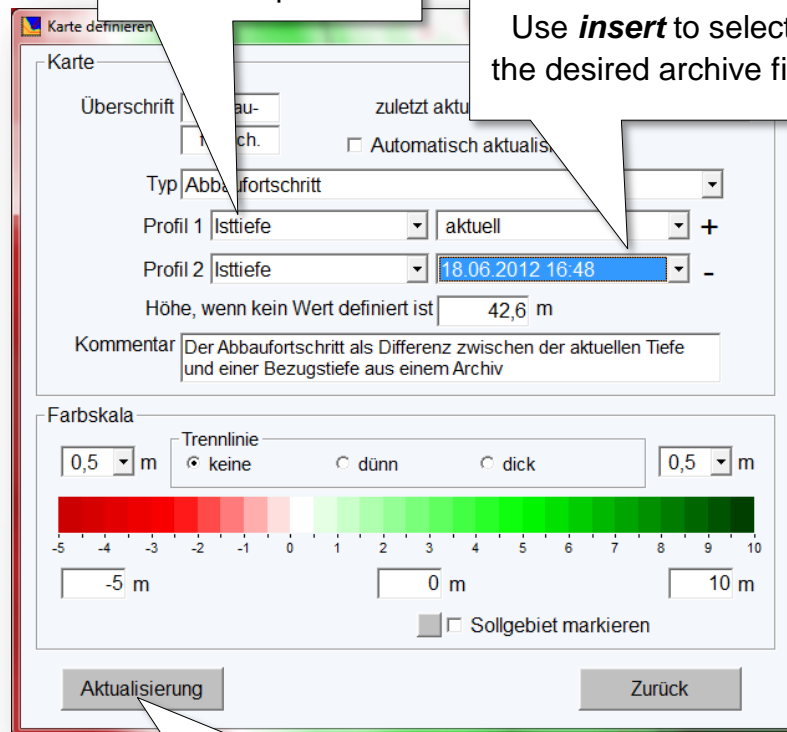
Map type	Colour scale	Description
Actual depth		The current depth (Actual)
Actual depth (extraction tool)		The current depth (Actual) of the extraction tool (echo sounder values not considered)
Maximum depth		The maximum depth reached until now (Max)
Maximum depth (extraction tool)		The maximum depth reached until now by the extraction tool (Max) without depiction of dislocated material
Depth of an arbitrary profile		Depth of an arbitrary profile (including Archive-profiles from available data backups)
Terrain model of a (random) profile		Digital terrain model of any profile
Remaining thickness		The difference between the current and the allowed depths (Actual - Target)
Remaining thickness (extraction tool)		The difference between the current and the allowed depths (Actual – Target) of the extraction tool without depiction of dislocated material
Maximum thickness		The difference between the maximum and the allowed depths (Max - Target)
Excavation difference		The difference between the current depth and the depth max. 15 minutes ago
Excavation progress		The excavation progress depicted as the difference between the current depth and a related reference depth from an archive
Remaining material		The thickness of the available excavation material (where the current depth is known identical to the remaining thickness Actual - Target)
Difference of two arbitrary profiles		The Difference of two arbitrary profiles (including Archive-profiles from available data backups)
Remaining thickness with sensible mining		Remaining thickness with sensible mining
Inclination of an arbitrary profile		Inclination of an arbitrary profile in degrees. A horizontal surface has an inclination equal to zero degrees.
Slope of an arbitrary profile		Slope of an arbitrary profile depicted as relation of depth difference by distance.
Thickness to the start of a layer		Thickness to the start of the layer x (Actual – Layer x)
Thickness of a layer to the target depth		Thickness of the layer x to the allowed depth
Thickness of a layer		Thickness of the layer x

Example

Creation of a map type **Excavation progress**. A difference profile between the current Actual-depth and the Actual-depth out of an archive (from 2012) is defined.



1 Open the configuration window and select the map type **Excavation progress**.

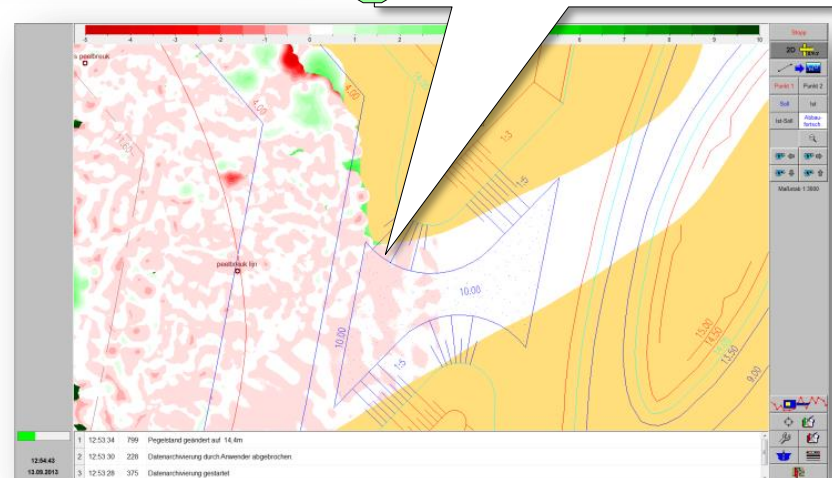


2 Choose profile

3 Use **insert** to select the desired archive file

4 After clicking **updating** the map segments will be re-calculated.

5 Changes of the current Actual-depth and the Actual-depth from the archive will be shown using the default differential colours.



Soll	Ist
Ist-Soll	Segment 70 / 84

6.1.3 Depiction of the anchor positions

The anchor positions will be defined graphical or as coordinate-sets. Using the depiction of the anchor ropes the possible mobility of the excavation device can be estimated.

1 A left-click onto the map opens the pulldown-menu containing the button **Anchor**.

2 Attachment points of the anchor ropes

3 Attachment points of the anchor ropes

4 To copy graphical defines anchor positions into the list: first **Add** then **Data loading**.

5 Assignment of attachment points to anchor positions

Ankerpunkte Dialog Box:

Anzeigen in Tabelle
 alle eingetragenen Punkte
 nur die angeschlagenen Punkte

Bagger-Anschlag-Pkt.	Ankerkoordinaten		
	Kennung	X/R	Y/H
2	NEU 1	197959,88	362296,33
2	NEU 1	197793,11	362212,76
4	NEU 1	197708,02	362016,56
1	NEU 1	197716,99	362200,81
3	NEU 3	197909,84	362082,93

Buttons: Ablage laden, Hinzufügen, Löschen, Ändern, Abbrechen, Übernehmen

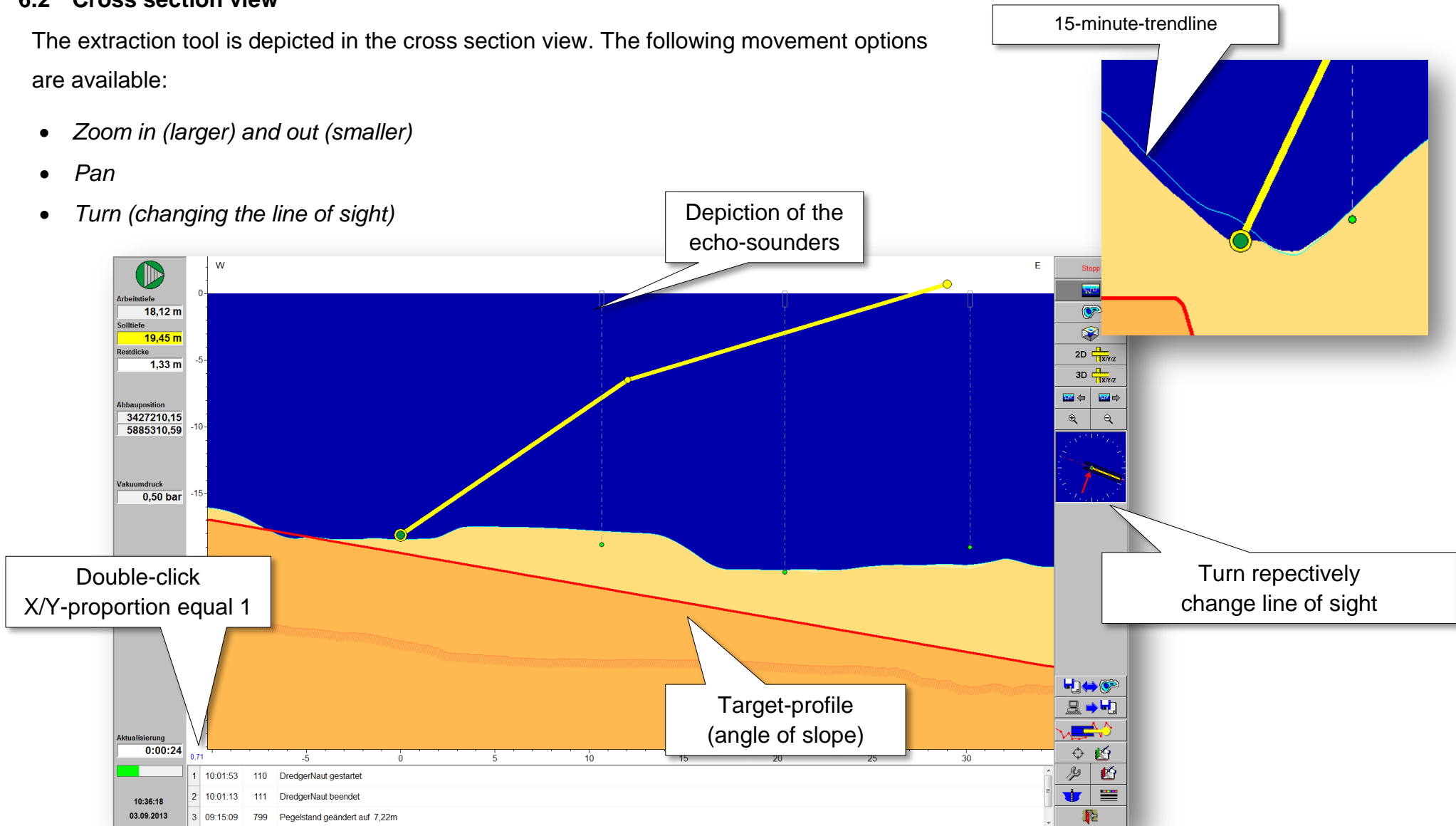
Map Info Panel:
 Arbeitstiefe: 0,05 m
 Solltiefe: 12,40 m
 Abstand: 12,35 m
 Info, Standortkommentar, Punkt hinzufügen, Punkte-Liste, Anker, Abbrechen

Log Panel:
 Aktualisierung: 0:00:44
 1 13:08:52 799 Pegelstand geändert auf 14,3m
 2 13:08:39 228 Datenarchivierung durch Anwender abgebrochen.
 3 13:08:38 375 Datenarchivierung gestartet

6.2 Cross section view

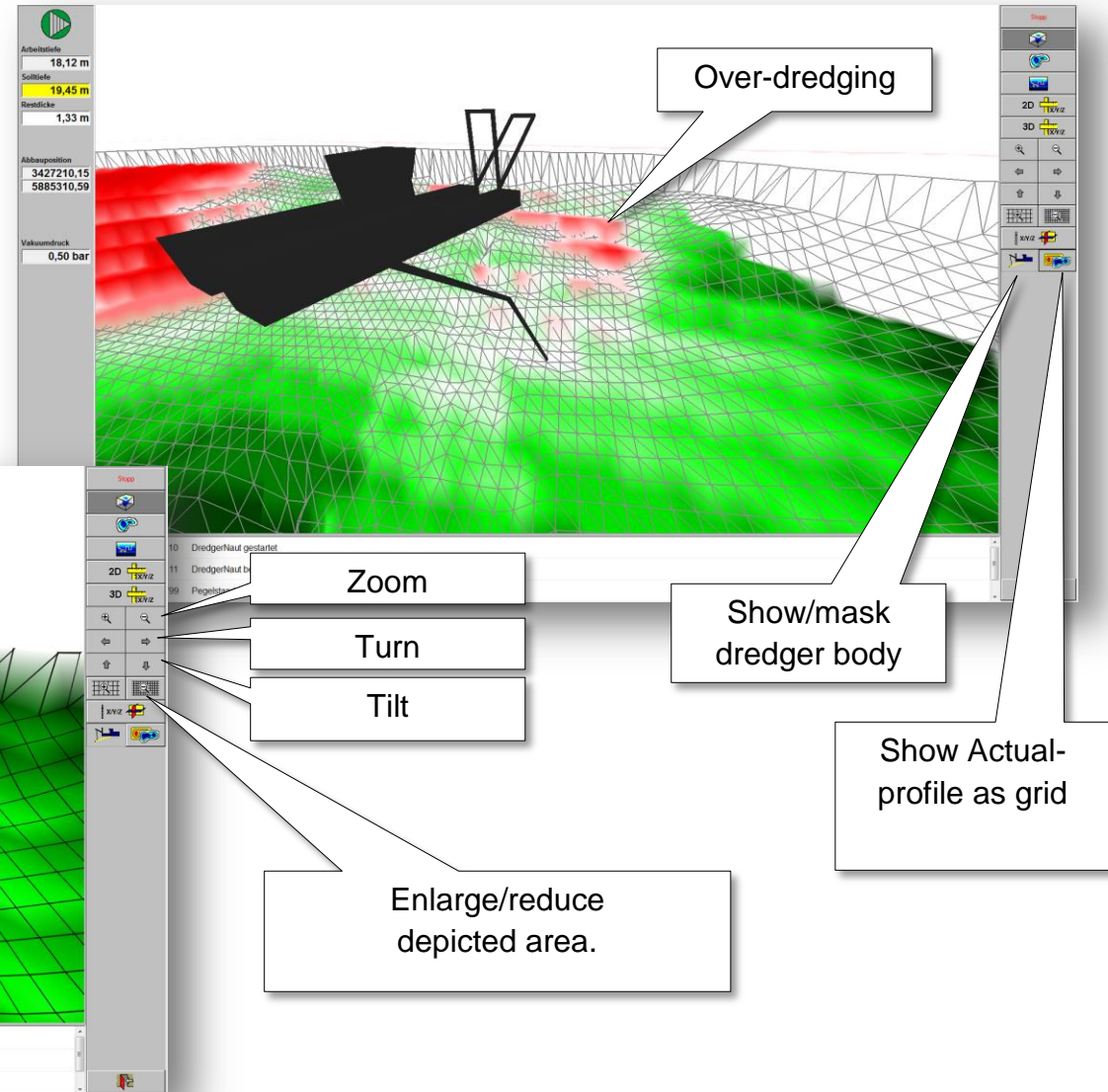
The extraction tool is depicted in the cross section view. The following movement options are available:

- *Zoom in (larger) and out (smaller)*
- *Pan*
- *Turn (changing the line of sight)*



6.3 3D view

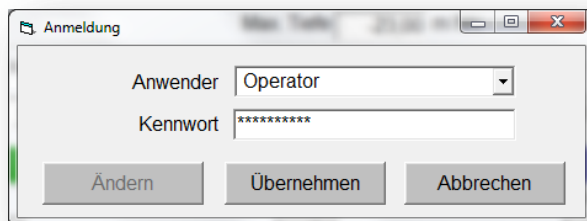
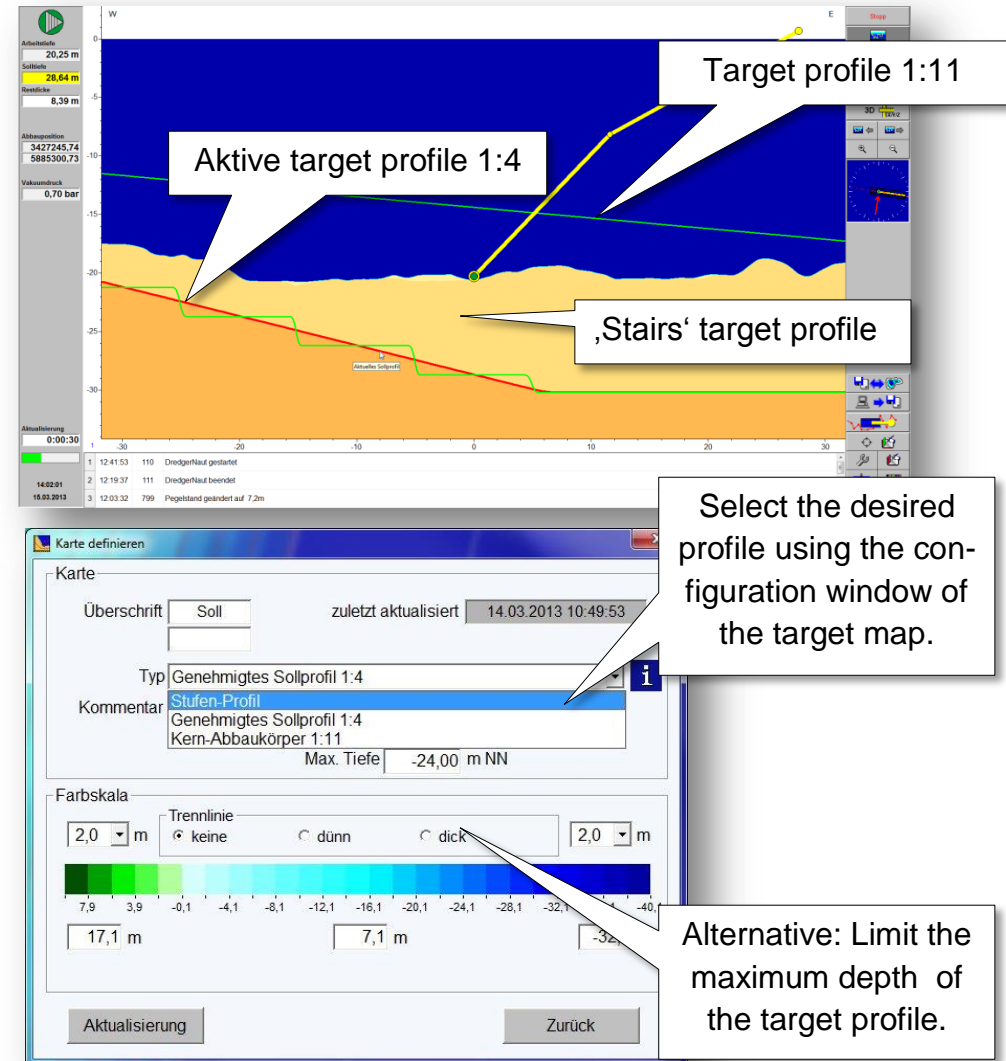
In 3D view the excavation device is shown three-dimensional. The pontoons (dredger body) can be masked so that only the extraction tool remains visible. The depicted areas can be enlarged respectively reduced. The Actual-profile will be shown either as a grid or a surface. If the Actual-profile is drawn as a grid the Target-profile will be shown as a surface. If the Target-profile surface penetrates the Actual-depths grid this visualizes over-dredging.



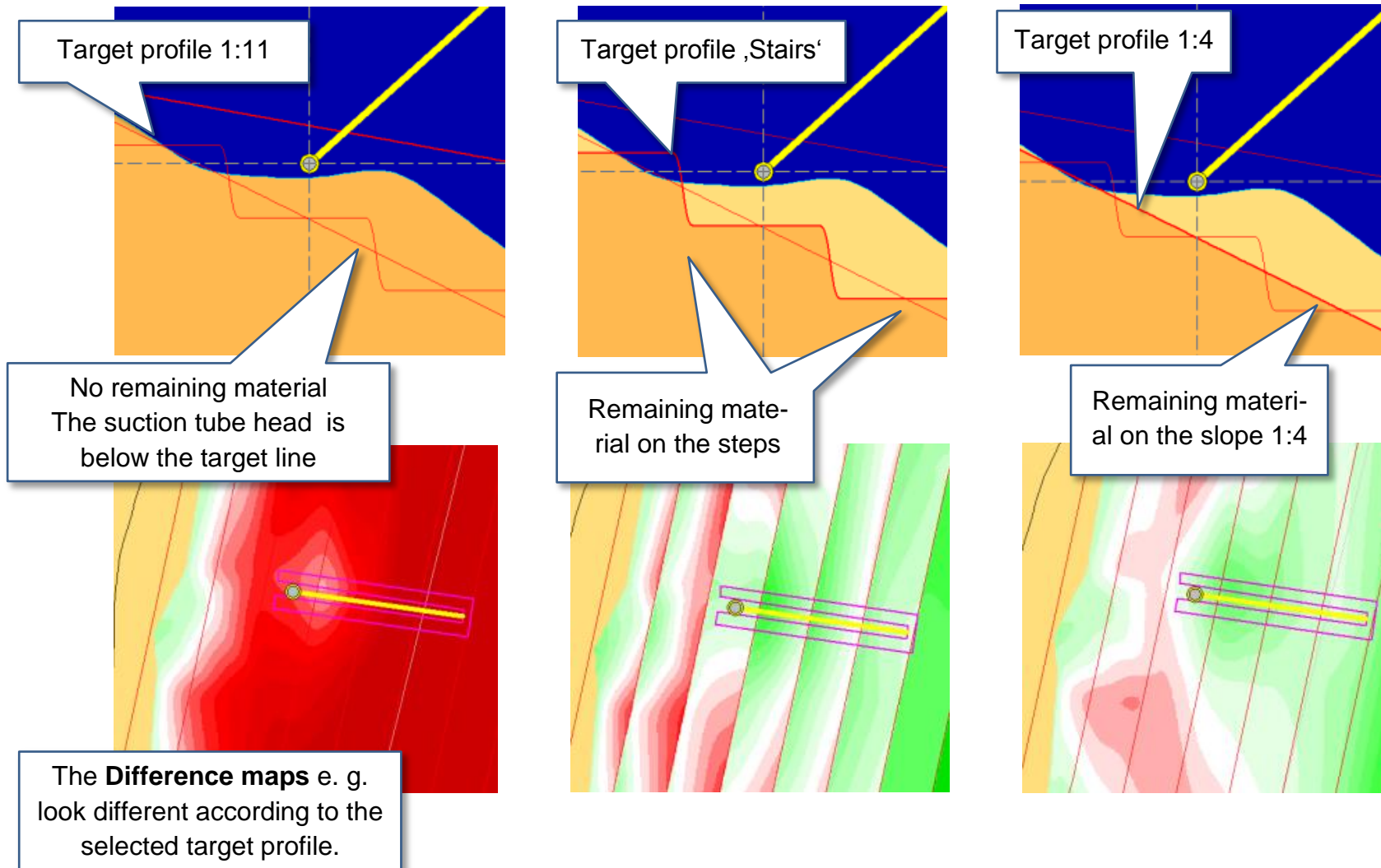
7 Target profile

The target profile will be defined e.g. by the landscape architect or the survey office. Additional helper- or working-target profiles can be used to accompany or support the excavation during different phases. **DredgerNaut** offers the following functions to administer target profiles:

- *It is possible to switch between different target profiles.*
- *The maximum depth can additionally be limited independent from the target profile.*
- *After switching to another target profile, dependant maps will be recalculated*
 - *Target map, difference maps, etc..*
- *Depiction of existing target profiles in cross section view using differentiated colours including tool-tips.*
- *Switching target profiles is protected by password.*



After selecting the desired target profile the dependant maps (Target-, difference-, Max-maps, etc.) will be re-calculated.



Drilling and layer analysis data can be incorporated into the 3D terrain profiles. The top edges of layers can be defined to act as maximum depths and blended in with the target profile.

1 Left-click onto the layer the top edge of which is to be defines as target depth.

2 The menu item „Layer“ opens the layer window

3 Layer edge declared to be target depth.

4.1 Layer edge as target depth.

4.2 Inclination of slope from target profile as target

4 The layers top edge is blended in with slope from the target profile. For each position the resulting minimum target depth defines the edge of the new blended target profile.

The 'Schicht' dialog box contains the following information:

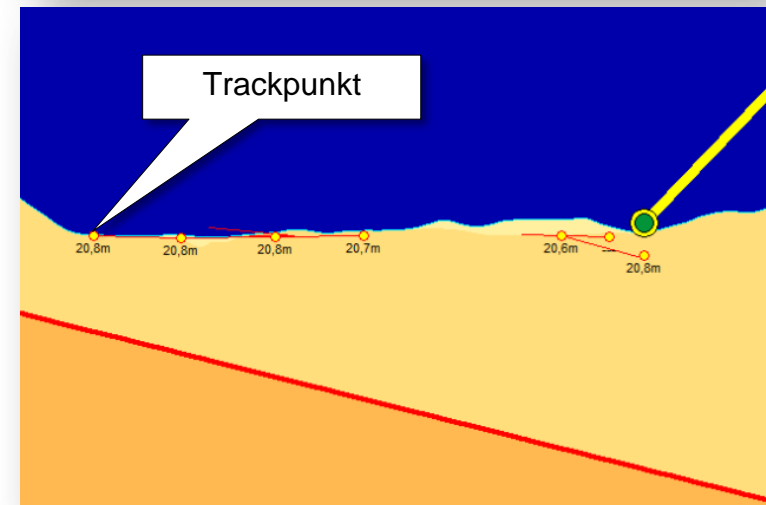
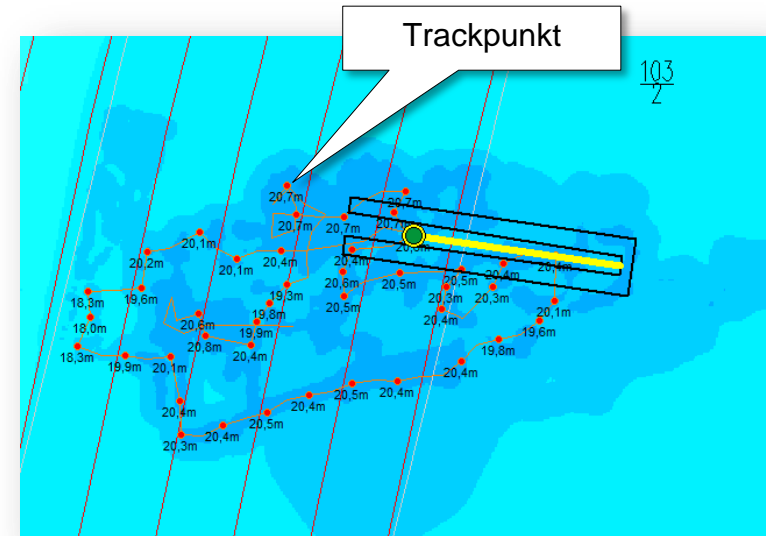
Schichtnummer	Farbe	Bezeichnung
3	[Cyan]	MAM2

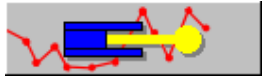
Additional fields in the dialog include: 'Kommentar' (MAM2) and a checked checkbox 'Schichtgrenze als Solltiefe deklarieren'. A 'Zurück' button is located at the bottom of the dialog.

8 Track data

The track data show the positions of the excavation device over time in map and cross section view. Thus, the excavation process becomes comprehensible and transparent. The following function options exist:

- *Presentation of the track-trail in online and measuring mode.*
- *Presentation of the track-trail in map and cross section view*
- *Labeling a track point with*
 - *Current-depth, max-depth or depth of extraction tool,*
 - *Date and*
 - *time*
- *The track-trail is differentiable between excavation operation and idle.*
- *The track-trail is differentiable between operators (e.g. employees).*
- *The track-trail is differentiable between different excavation devices at the same mining location.*
- *The track-trail display colours are selectable (text, lines und points).*
- *The track-trail can be viewed in detail in tables.*
- *The track-trail can be exported into a text file.*





Opens the window
Track

Show track data from selected operation mode(s).. Track data from older DN versions (pre version 10.0) will always be labeled „unknown“.

Choice of information labeling each track point.

Choice of operator

Choice of time period

Number of track points

Choice of colours

The distance of 2 track points can be configured inside AdminTool.

Export into text file

9 Position comments, drilling data and layers

9.1 Position comments

The current excavation position can be saved as a position comment and later be shown in the map for orientation. Text comments (like clay, wood, good quality, etc.) further document the excavation.

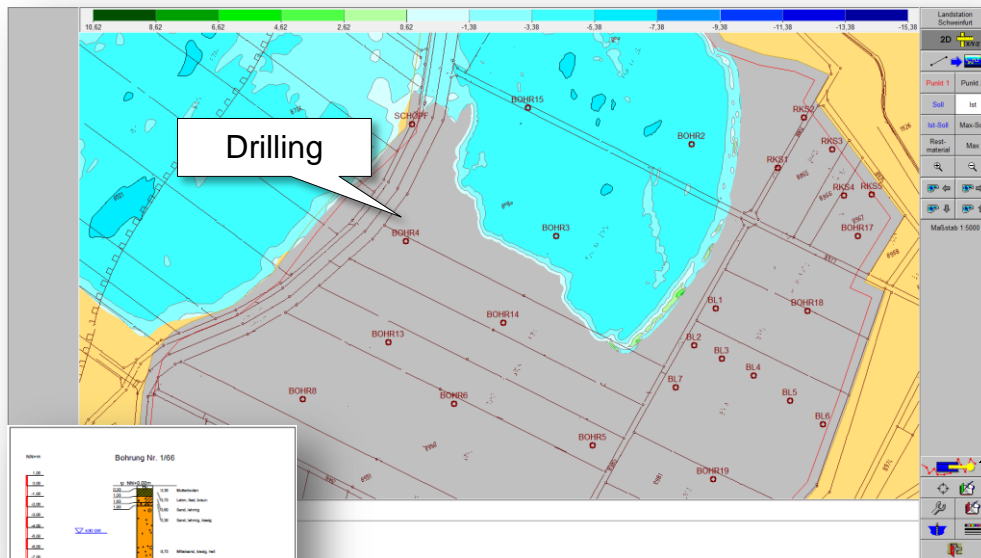
Nr	Anzeigen	Positionsmerker	Kommentar	Position x	Position y	Datum/Uhrzeit	Anwender
790	<input type="checkbox"/>	757	Diepte 15,96m NAP	173374,15	360541,62	24.04.2012 11:12:31	
789	<input checked="" type="checkbox"/>	756	Diepte 14,25m NAP	173396,95	360548,21	19.04.2012 08:29:39	
788	<input checked="" type="checkbox"/>	755	Diepte 9,19m NAP	173396,27	360521,58	13.04.2012 09:19:39	
787	<input checked="" type="checkbox"/>	754	Diepte 12,10m NAP	173398,06	360508,23	06.04.2012 08:45:05	
786	<input checked="" type="checkbox"/>	753	Diepte 9,30m NAP	173388,15	360470,43	30.03.2012 08:24:02	
785	<input checked="" type="checkbox"/>	752	Diepte 8,51m NAP	173394,76	360491,92	29.03.2012 09:43:57	
784	<input checked="" type="checkbox"/>	751	Diepte 11,48m NAP	173387,64	360500,40	26.03.2012 11:42:37	
783	<input checked="" type="checkbox"/>	750	Diepte 9,34m NAP	173382,73	360508,75	23.03.2012 10:39:11	
782	<input checked="" type="checkbox"/>	749	Diepte 11,08m NAP	173376,49	360517,96	13.03.2012 09:26:02	
781	<input checked="" type="checkbox"/>	748	Diepte 11,02m NAP	173368,66	360526,77	07.03.2012 10:22:23	
780	<input checked="" type="checkbox"/>	747	Diepte 16,80m NAP	173360,44	360539,24	06.03.2012 06:54:46	
779	<input checked="" type="checkbox"/>	746	Diepte 11,68m NAP	173348,60	360546,95	01.03.2012 09:11:36	
778	<input checked="" type="checkbox"/>	745	Diepte 19,66m NAP	173335,32	360552,94	24.02.2012 11:51:34	

Buttons: Anzeigen, Ausblenden, Ausgabe, Muster, Standortkommentare.xlt, Hinzufügen, Importieren, Bearbeiten, Exportieren, Löschen, Zurück

Callouts:
 - Position comment(s) show / mask (points to Anzeigen/Ausblenden)
 - Add position comment (points to Hinzufügen)

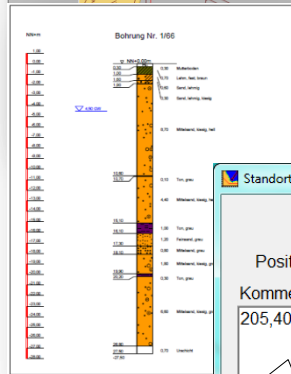
9.2 Drilling data and layers

Individuell drillings can be depicted as position comments including the results of the analysis. The integration of the analysis results has to be done offline.



Nr	Anzeigen	Positionsmerker	Kommentar	Position x	Position y	Datum/Uhrzeit	Anwender
32	☑	SCHÖPF	Schöpfgrad	4372962,73	5543693,37	-03.2012.14.04	TEAM
31	☑	BL7	205,851,8/6,2	4373155,48	5543350,89	-03.2012.14.04	TEAM
30	☑	BL6	205,553/5	4373283,90	5543473,68	-03.2012.14.04	TEAM
29	☑	BL5	205,772,8/5	4373239,24	5543490,96	-03.2012.14.04	TEAM
28	☑	BL4	206,082/5,5	4373212,47	5543509,42	-03.2012.14.04	TEAM
27	☑	BL3	206,132/4	4373189,17	5543521,65	-03.2012.14.04	TEAM
26	☑	BL2	206,052/6	4373169,09	5543531,34	-03.2012.14.04	TEAM
25	☑	BL1	206,062,3/5	4373184,78	5543558,34	-03.2012.14.04	TEAM
24	☑	RKS5	205,743,1/3,4	4373298,75	5543641,69	-03.2012.14.04	TEAM
23	☑	RKS4	205,733,6/2,5	4373278,50	5543640,88	-03.2012.14.04	TEAM
22	☑	RKS3	205,9/3,7/2,7	4373269,98	5543674,98	-03.2012.14.04	TEAM
21	☑	RKS2	206,012,5/3,4	4373249,11	5543698,19	-03.2012.14.04	TEAM
20	☑	RKS1	205,933,4/2,4	4373230,15	5543661,48	-03.2012.14.04	TEAM
19	☑	BOHR19	205,845/1,2/5,4	4373182,95	5543433,68	-03.2012.14.04	TEAM
18	☑	BOHR18	205,548/2,7/3,3	4373251,95	5543556,75	-03.2012.14.04	TEAM
17	☑	BOHR17	205,588/3/2,8	4373288,77	5543611,22	-03.2012.14.04	TEAM
16	☑	BOHR16	205,901/1,1/5	4373052,54	5543785,00	-03.2012.14.04	TEAM
15	☑	BOHR15	206,182/0,2/6,8	4373047,49	5543705,28	-03.2012.14.04	TEAM
14	☑	BOHR14	206,110,7/6,4	4373029,25	5543547,82	-03.2012.14.04	TEAM
13	☑	BOHR13	205,410,2/5,9	4372945,28	5543533,68	-03.2012.14.04	TEAM
12	☑	BOHR12	205,356,5/0	4372856,28	5543375,97	-03.2012.14.04	TEAM
11	☑	BOHR11	206,109/1,6/4,2	4372941,70	5543380,90	-03.2012.14.04	TEAM
8	☑			5543460,40	-03.2012.14.04	TEAM	
5	☑			5543310,78	-03.2012.14.04	TEAM	

The list of position comments contains also drillings.



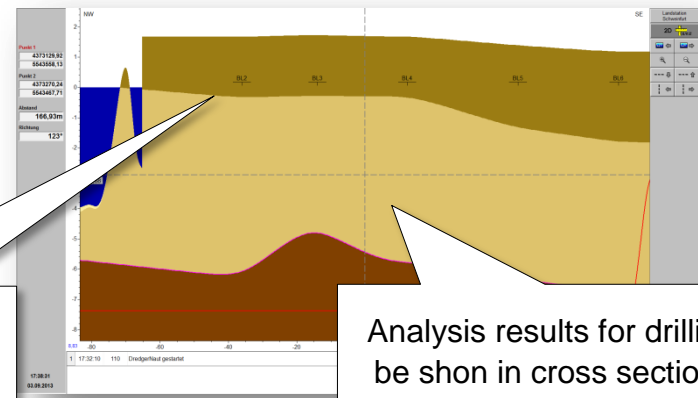
Standortkommentar anzeigen

Abstand Nr

Positionsmerker

Kommentar

A position comment can be opened by clicking it in the map.



Drilling positions will additionally be shown in cross section view.

Analysis results for drillings will be shown in cross section view.

10 Operations protocol

10.1 Default operations protocol

The operations protocol is intended to document production data and is available as Excel- or RTF-export.

Working time

Material time and time of operation

Maximum depth

Operator

Logging water gauge

Choice of month

Excel-export

Water gauge history

Tag	Wochentag	Beginn	Ende	Materialzeit	Betriebszeit	Pegel	X	Y	Tiefe	Anwender	Kommentar
1	Dienstag	07:21	21:36	12:09	14:16	89,81	196671	324518	79,04	ADMIN	
2	Mittwoch	07:16	21:38	11:39	14:20	89,81	196697	324564	79,54	ADMIN	
3	Donnerstag	07:26	21:39	11:56	14:00	89,81	196716	324570	79,86	ADMIN	
4	Freitag	07:15	21:55	11:46	14:13	89,81	196651	324565	79,63	ADMIN	
5	Samstag										
6	Sonntag										
7	Montag	06:15	20:34	12:26	14:19		196725	324575	80,57		
8	Dienstag	06:11	21:01	10:34	12:51	89,81	196734	324582	80,79	ADMIN	
9	Mittwoch	06:22	20:40	13:22	14:18	89,79	196742	324599	81,48	ADMIN	
10	Donnerstag	12:25	23:59	6:46	7:22	89,71	196730	324612	81,63	ADMIN	
11	Freitag	06:15	23:59	13:01	14:29	89,71	196710	324611	81,38	ADMIN	
12	Samstag						196710	324606	86,72		
13	Sonntag						196710	324605	86,72		
14	Montag	06:15	21:38	11:47	14:03	89,71	196738	324621	80,88	ADMIN	
15	Dienstag	06:15	21:38	11:25	13:22	89,68	196744	324615	81,42	ADMIN	
16	Mittwoch	06:22	21:37	13:22	14:18	89,66	196751	324631	81,71	ADMIN	
17	Donnerstag	06:22	21:36	13:25	14:31	89,65	196768	324592	81,04	ADMIN	
18	Freitag	06:28	21:38	13:45	14:43	89,62	196760	324587	81,10	ADMIN	
19	Sonntag										
20	Montag	06:15	20:42	11:24	13:39	89,64	196757	324638	81,52	ADMIN	
21	Dienstag	06:21	20:39	12:28	14:16	89,64	196710	324636	81,45	ADMIN	
22	Mittwoch	06:21	20:45	10:52	13:30	89,59	196718	324665	81,83	andre	
23	Donnerstag	06:21	11:47	0:25	0:52	89,61	196729	324646	82,02	andre	

Water gauge history

Graph showing water gauge history (mNAP) over 11 months. The y-axis ranges from 88.00 to 91.00 mNAP. The x-axis shows months 1 to 11. A dashed line indicates a reference level of 90.00 m. The data points show a slight downward trend from approximately 90.50 m in month 1 to 89.50 m in month 11.

10.2 Working time- and production data-acquisition

The operations protocol can be recorded differentiating by employee/operator and that way be used as working time and production data record, implementing password protection if needed.

Documentation of important production data

Tag	Wochentag	Anwender	Login	Logout	Beginn	Ende	Tonnen	Hübe	Kipprost	Pegel	R.	H.
14	Dienstag	FRED	05:58	21:59	00:00	17:18	2155	345	29	188,50	-53133	5365113
15	Mittwoch	FRED	12:04		00:00	17:18	1023	283	25	188,50	-53137	5365101
		LEMANN	18:01	06:00	18:07	05:59	992	443	36	188,50	-53136	5365102
16	Donnerstag	FRED	06:01		00:00	23:58	3554	144	18	188,50	-53140	5365105
		LEMANN	18:00	06:00	18:02	05:54	954	338	20	188,50	-53144	5365107
17	Freitag	FRED	06:01		00:00	17:56	1544	341	39	188,50	-53152	5365106
		LEMANN	18:00	06:00	18:02	05:54	720	216	15	188,50	-53148	5365104
		FRED	06:00	14:42	06:05	14:42	420	230	25	188,50	-53144	5365100
		FRED	14:43	14:44	15:50	15:50	183	45	6			
		LEMANN	15:52	01:32	15:55	01:28	1414	400	22			
18	Samstag				00:00	01:28	253	87	5			
19	Sonntag				00:00	00:00						
20	Montag	RAU	06:14		06:28	23:59	2460	574	99			
		FRED	17:06	01:39	17:07	01:36	1003	280	63			
21	Dienstag	RAU	06:18		06:22	15:53	1532	301	35			
		FRED	15:55	01:31	16:02	01:20	1545	316	50			
22	Mittwoch	RAU	06:10		06:15	08:21	404	71	8			

Employee

Working time

Choice of month

Excel-export

Excel-export (Betriebsprotokoll 17.05.2006)

Tag	Wochentag	Beginn	Ende	Reibsch	Pegel	X	Y	Anwender	Kommentar
1	Montag	06:30	19:45	02:39	33,20	30534814	6005050	BLAHE	
2	Dienstag	06:16	19:04	06:41	33,20	30534890	6005073	BLAHE	
3	Mittwoch	07:16	16:30	06:46	33,20	30534805	6005060	BLAHE	Software Update BWR
4	Donnerstag	07:50	19:39	06:07	33,20	30534799	6005060	BLAHE	BS FU für Saughwinden
5	Freitag	06:06	17:39	07:52	33,20	30534816	6005056	BLAHE	Servicestart DB, BWR
6	Sonntag					30534801	6005061		
7	Sonntag					30534801	6005061		
8	Montag	07:10	16:17	06:22	33,20	30534804	6005056	BLAHE	
9	Dienstag	06:13	19:53	06:49	33,20	30534807	6005078	BLAHE	
10	Mittwoch	06:21	19:46	09:07	33,20	30534814	6005063	BLAHE	
11	Donnerstag	06:30	19:46	11:23	33,20	30534803	6005068	BLAHE	
12	Freitag	06:26	11:22	06:09	33,20	30534806	6005073	BLAHE	
13	Sonntag					30534804	6005073		
14	Sonntag					30534807	6005073		
15	Montag	06:02	19:46	06:43	33,20	30534809	6005073		
16	Dienstag				33,20	30534805	6005073	BLAHE	Reparatur Decalagegest
17	Mittwoch				33,20	30534805	6005073	BLAHE	Reparatur Decalagegest
18	Donnerstag								
19	Freitag								
20	Sonntag								
21	Montag								
22	Dienstag								
23	Mittwoch								
24	Donnerstag								
25	Freitag								
26	Sonntag								
27	Montag								
28	Dienstag								
29	Mittwoch								
30	Donnerstag								
31	Freitag								

11 Message protocol

DredgerNaut will generate different messages during different situations (notes, warnings, etc.). The message protocol records the actions in the DredgerNaut system and facilitates error diagnostics.

The screenshot shows the DredgerNaut message protocol interface. It includes a list of messages, a confirmation dialog box, and a main message list window. Four numbered callouts provide instructions:

- 1** A doubleclick onto the messages will open the confirmation window.
- 2** Confirmation of messages
- 3** Open the message protocol
- 4** Close the message protocol

The message list shows the following data:

Uhrzeit	Typ	Nr	Meldung
22.11.39	Hinweis	111	DredgerNaut beendet
17.38.18	Hinweis	799	Pegelstand geändert auf 7,21m
17.38.05	Hinweis	374	Das Datenarchiv HENK-Sauger_2013-07-23_17-37 wurde erstellt
17.37.56	Hinweis	375	Datenarchivierung gestartet
17.37.54	Hinweis	110	DredgerNaut gestartet
17.37.49	Hinweis	111	DredgerNaut beendet
17.37.36	Hinweis	799	Pegelstand geändert auf 7,21m
17.37.27	Hinweis	228	Datenarchivierung durch Anwender abgebrochen.
17.37.26	Hinweis	375	Datenarchivierung gestartet
17.37.25	Hinweis	110	DredgerNaut gestartet

The confirmation dialog box shows the following settings:

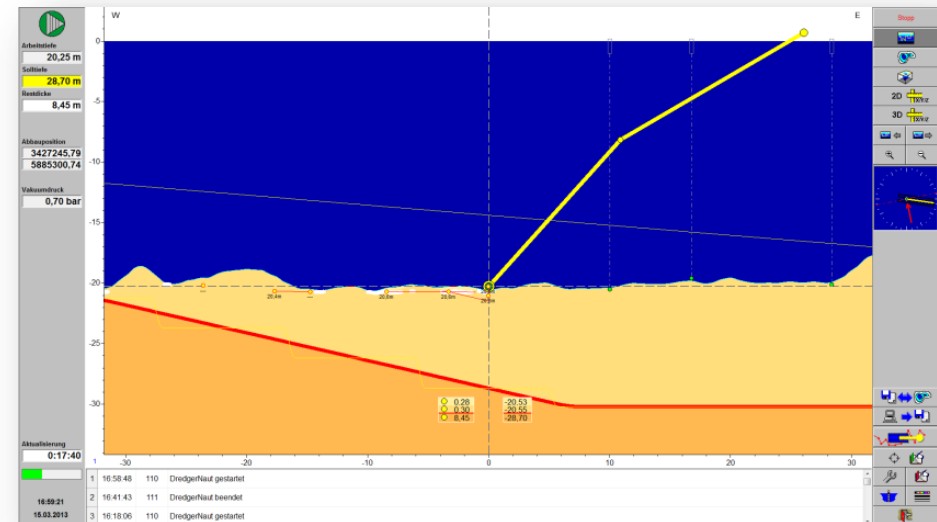
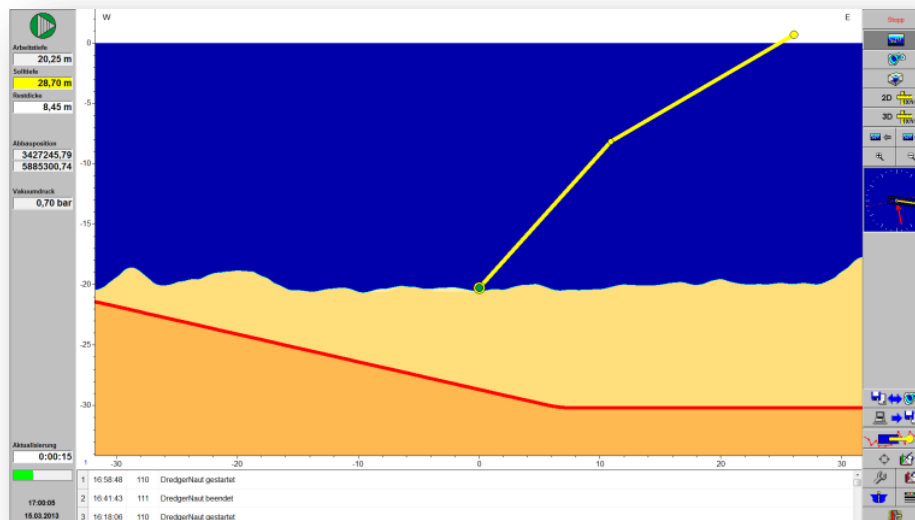
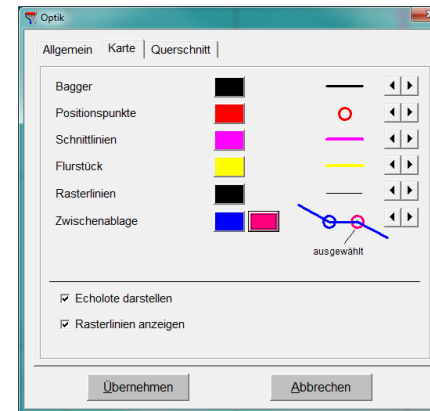
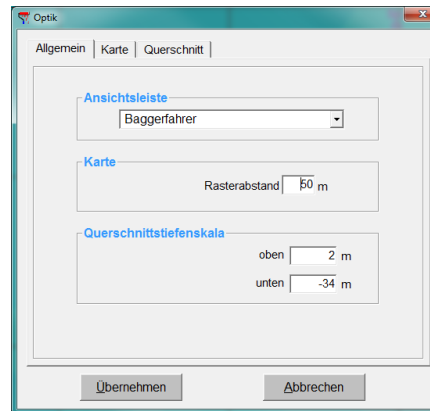
- Anzahl: 18
- Meldungstypen: Hinweis, Warnung, Benutzer, Zeitgesteuert
- Datum: 03.09.2013
- Buttons: Quittieren, Abbrechen

12 Visual appearance

The optical representation can be adjusted separately for **map** and **cross section view**.

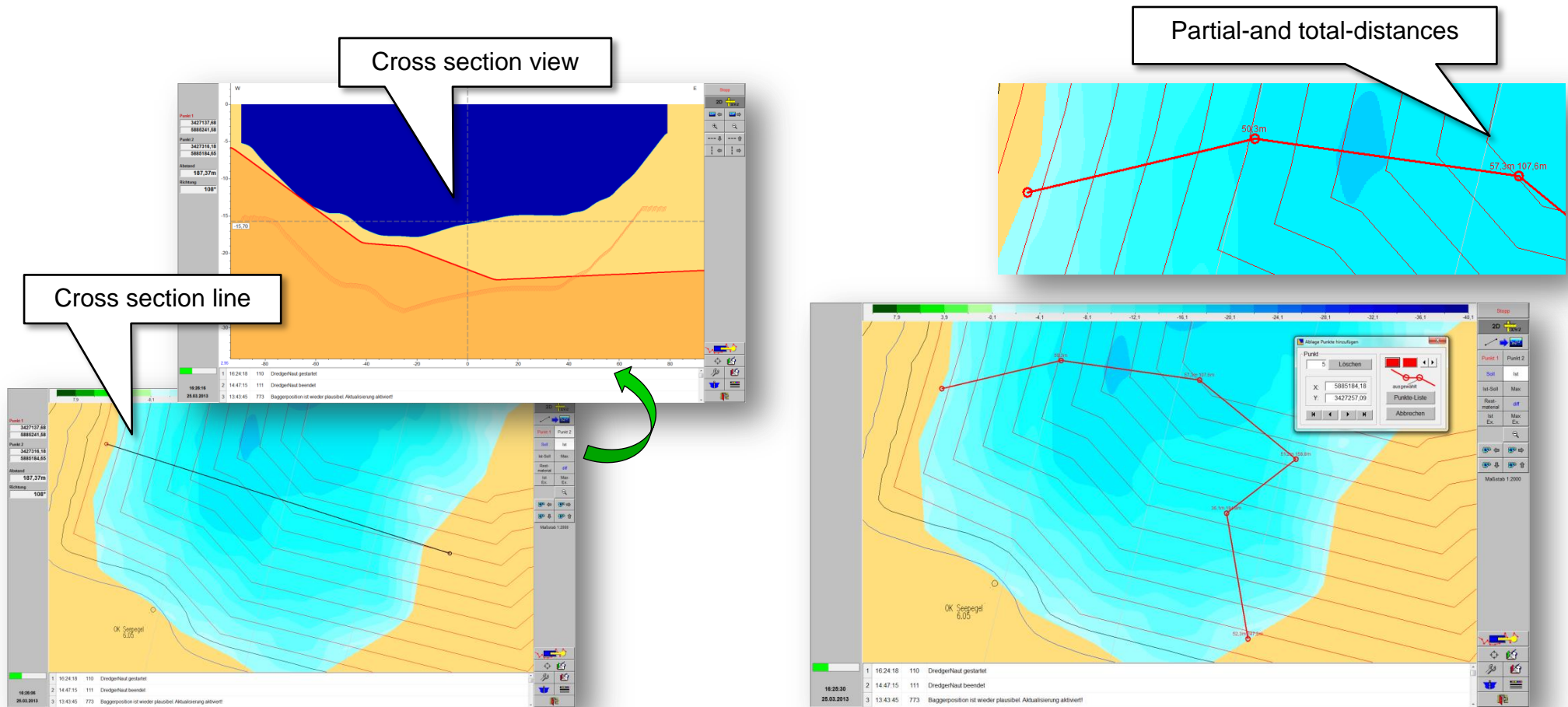
Optical settings:

- *additional target profiles*
- *depth of excavation tool*
- *echo sounders*
- *track data*
- *depth informations*
- *crosshairs*
- *raster lines*
- *etc.*



13 Measuring mode

Independent of the position of the excavation device freely configurable cross sections and measurements in the 3D terrain models are possible.



13.1 Creation of polygonal lines

In a lot of situations **DredgerNaut** offers the possibility to insert individual points or polygonal lines by means of the clipboard. This tool, at the same time, comprises measuring and export functions.

Polygonal line as a contour

	R	H	Ist
1	3427176,58	5885261,28	-13,46
2	3427199,97	5885282,67	-17,31
3	3427210,13	5885285,44	-20,11
4	3427219,36	5885285,29	-20,31
5	3427229,06	5885282,36	-19,07
6	3427234,60	5885282,98	-19,78
7	3427242,75	5885282,83	-20,23
8	3427231,67	5885232,35	-17,61
9	3427234,14	5885229,12	-17,49
10	3427237,83	5885221,73	-17,22
11	3427239,37	5885212,96	-15,47
12	3427239,52	5885202,96	-14,84
13	3427239,52	5885198,19	-14,51

1 Left-click to open the pull-down menu and select **Add point.**

2 More points can be added by additional mouse-clicks.

3 Open list of points

4 Choose distance

5 Curve not closed

6 Open polygonal line for measurement

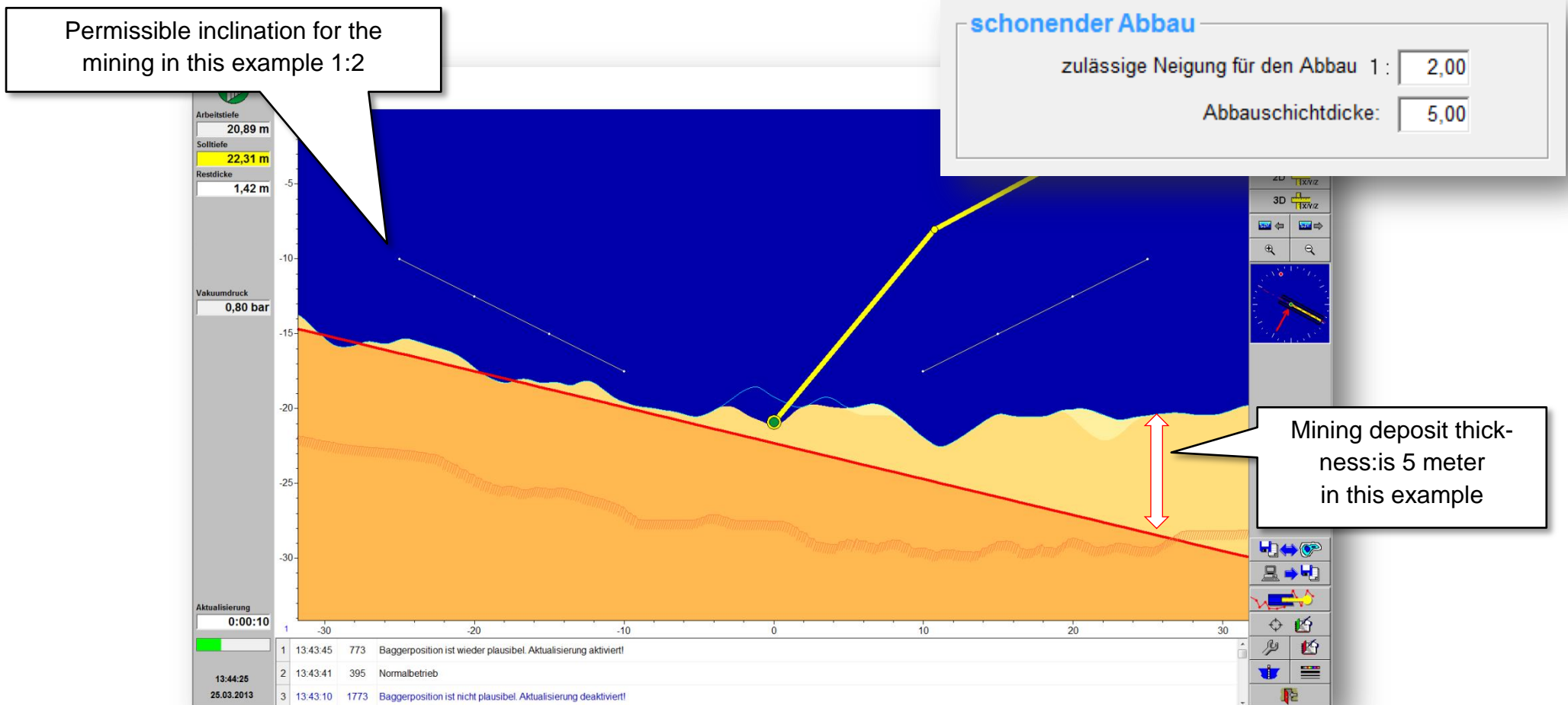
R	H	Ist	
1	3427238,37	5885299,37	-20,35
2	3427264,69	5885287,21	-19,16
3	3427272,53	5885261,51	-17,54

ist-Soll	Max
ist-Soll	Max
Rest-material	diff
ist-Ex	Max Ex

Time	Point	Action
16:15:38	110	DredgerNaut gestartet
16:33:57	111	DredgerNaut beendet
14:33:44	110	DredgerNaut gestartet

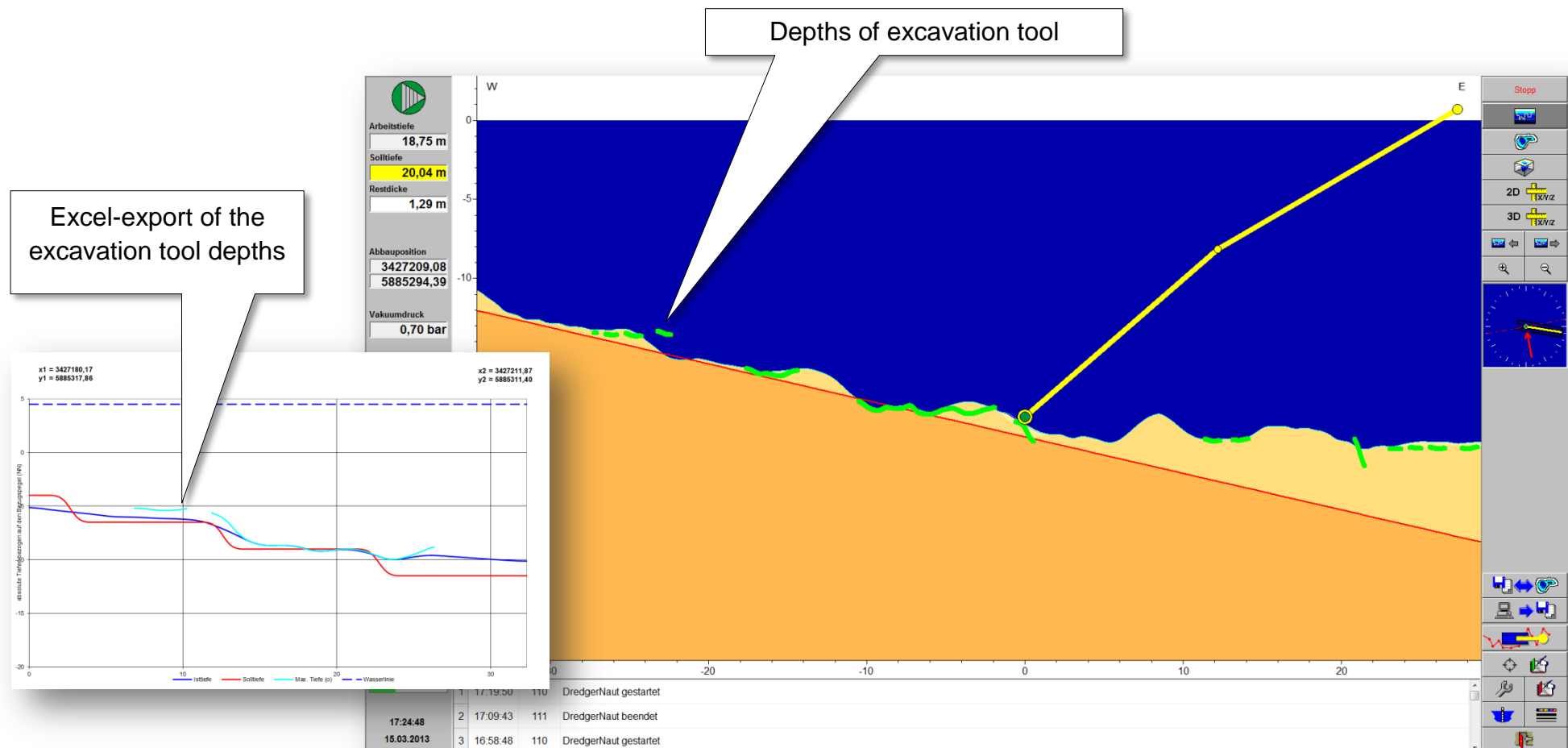
14 Sensible mining

The function „sensible mining“ will assist the operator in the creation of permissible slope inclinations. This function is not activated by default. The parameters of the sensible mining are adjusted inside AdminTool.



15 Tracking the excavation tool depth


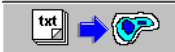

The excavation tool (suction tube head, grab or the slack of a bucket chain) can be considered independent from the echo sounder values. The settings for tracking the excavation tool can be adjusted inside AdminTool.

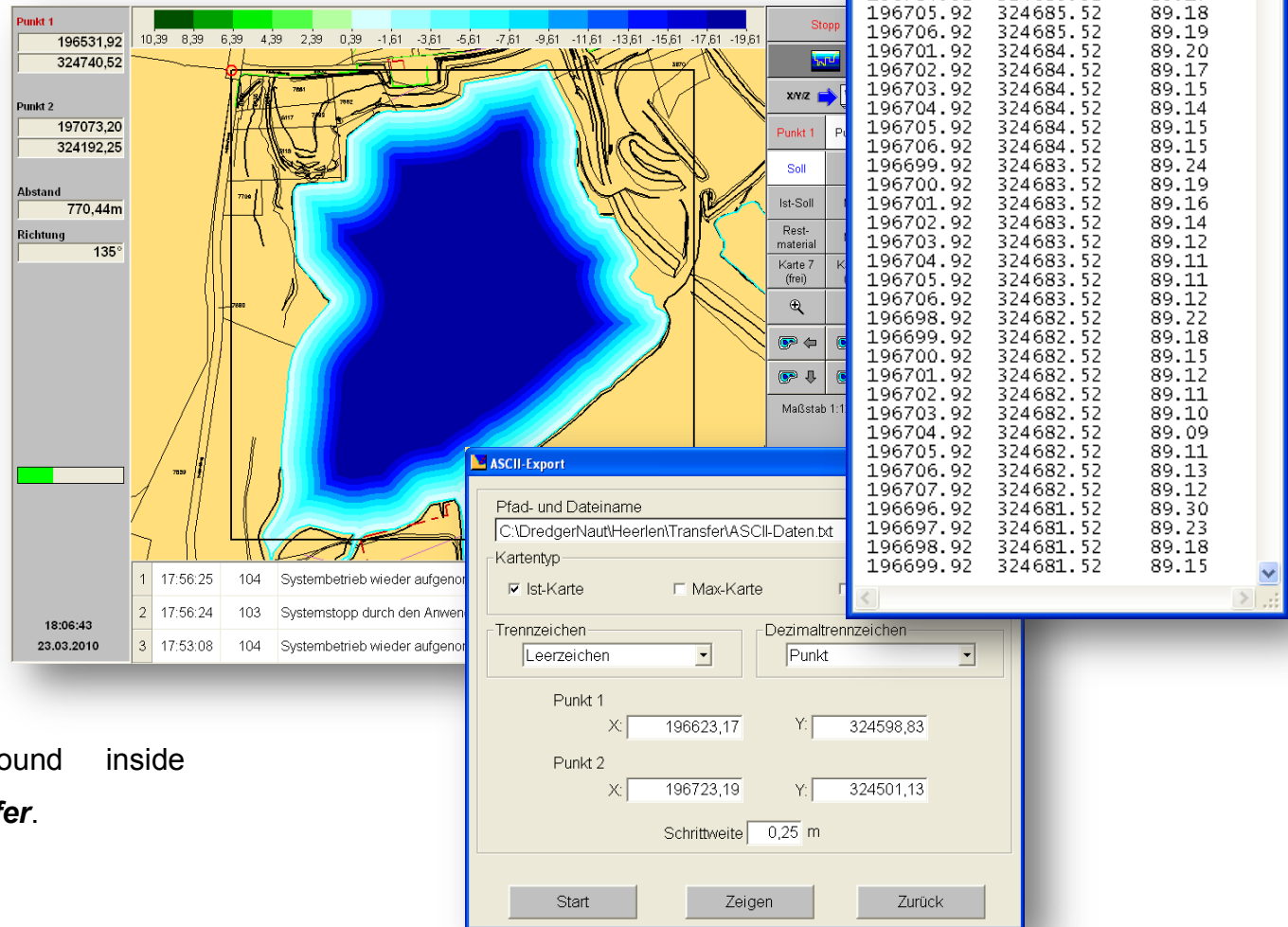


16 Data transfer

DredgerNaut offers the following possibilities to transfer data.

Functions

-  **Data-export**
-  **Data-import**
-  **Delete data**



The screenshot displays the DredgerNaut interface. On the left, a panel shows coordinates for 'Punkt 1' (196531,92; 324740,52) and 'Punkt 2' (197073,20; 324192,25), along with distance (770,44m) and direction (135°). The main area shows a bathymetric map with a color scale from 10,39 to -19,61. A table at the bottom lists system events:

Time	Code	Description
17:56:25	104	Systembetrieb wieder aufgenommen
17:56:24	103	Systemstopp durch den Anwender
17:53:08	104	Systembetrieb wieder aufgenommen

Overlaid on the map are two windows:

- ASCII-Daten.txt - Editor**: A text editor showing a list of data points with columns for X, Y, and Z coordinates.
- ASCII-Export**: A dialog box for exporting data. It shows the file path 'C:\DredgerNaut\Heerlen\Transfer\ASCII-Daten.txt', 'Ist-Karte' selected, and coordinates for 'Punkt 1' (X: 196623,17; Y: 324598,83) and 'Punkt 2' (X: 196723,19; Y: 324501,13). The step width is set to 0,25 m.

Detailed informations are to be found inside the manual **Documentation and data transfer**.

17 Documentation

DredgerNaut Manager offers the following possibilities for documentation.

Functions



Print



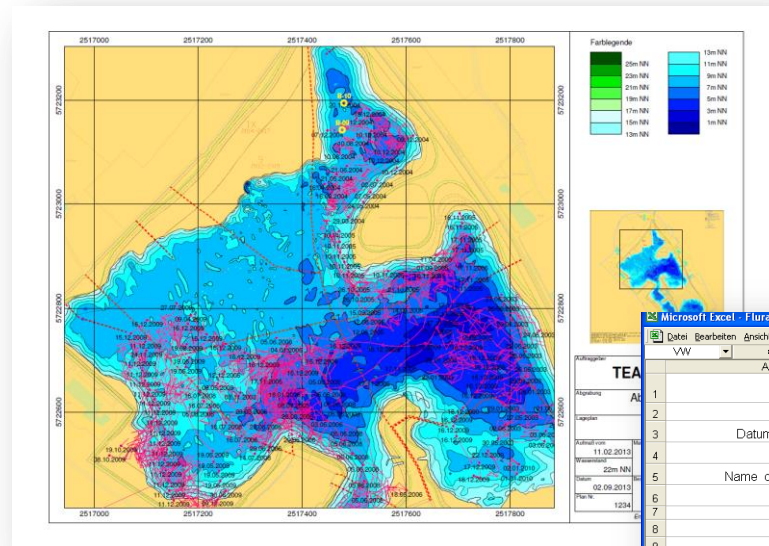
DXF-export



Excel intersections



Deposit assessment (calculation of volumes)



Flurauswertung		
bezogen auf Wasserlinie		
Datum der Auswertung	28.09.2008	
Datenstand	22.08.2008	
Name des Vorkommens	Berg	
Flurname	Flur 01-02-03-04	
	R	H
1	238.632,63	185.041,04
2	239.127,30	184.823,20
3	238.992,03	184.659,92
4	238.791,93	184.591,08
5	238.787,91	184.341,25
6	238.679,00	184.281,99
7	238.273,80	184.390,89
8	238.180,91	184.535,04
9	238.554,08	184.866,57
Wasserlinie [NAP]	60,00	m
Flurfläche	356.916	m ²
Seefläche	107.547	m ²
Gesamtvolumen bis Soll-Tiefe	4.136.977	m ³
Restvolumen	3.370.028	m ³
Wasservolumen	766.949	m ³
Überbaggert	0	m ³

Detailed informations are to be found inside the manuals **Documentation** and **data transfer** and **Deposit assessment**.

