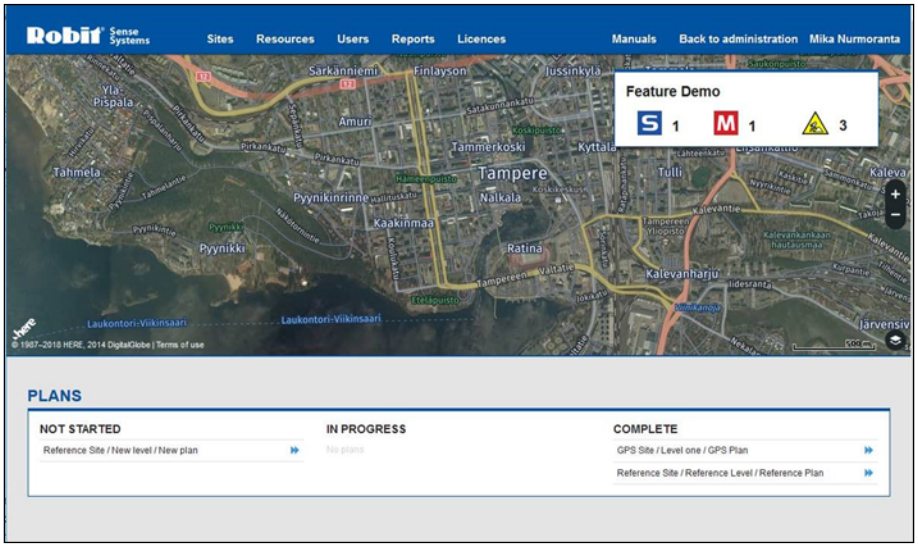
Robit Sense Systems

Operator's Manual



Cloud Service

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Contents

1 Introduction to Cloud Service

Robit Sense Systems Cloud Service is a web-based solution for monitoring rock drilling measurements. Go to https://www.sensesystems.com in order to access the application.

You need to enter your username and password to use the Sense Systems Cloud Service.

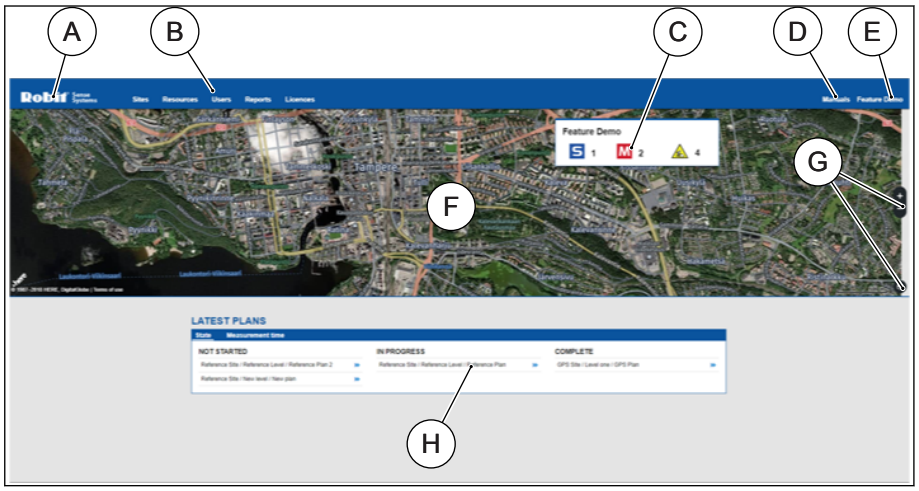
Note: Continuous system development and updates may have resulted in features and functions not described in this manual release.

Contact information

If you have any problems using the Cloud Service application, please contact Robit Plc specialists.

1.1 User interface

The main screen of the Cloud Service application consists of the following functions and features:



UI area	Functions	UI area	Functions
A	Return to main screen	E	Current user
B	Select different views	F	Map view
C	Company information window	G	Map controls
D	Product documentation	H	Latest drilling plans

Sites view

Drilling sites are managed in the Sites view. You can, for example, attach drilling plans for a drilling site. You can also add/remove drilling sites from the Cloud Service. Open the selected drilling site by clicking its name in the Sites view.

Resources view

Resources view is used for managing the resources available for a drilling site. You can, for example, add files or comments related to individual drilling rigs or other equipment from a drilling site. You can view the selected resource by clicking its name in the Resources view.

Users view

In Users view, you can add or edit users of the Sense Systems Cloud Service.

Reports view

The Reports view is used for viewing drilling efficiency of a selected site/resource within a chosen timespan.

Licenses view

The Licenses view is used for viewing license information and for registering tablet computers to the Cloud Service.

Manuals

The Manuals view provides online access to Sense Systems product documentation.

Company information window

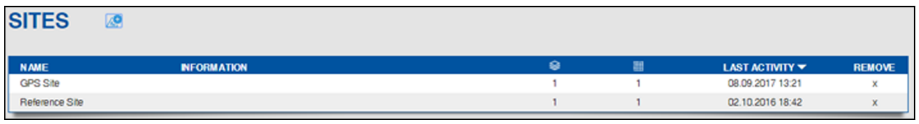
The Company infomation window shows the Sites and Resources of the current company.

Drilling Plan overview

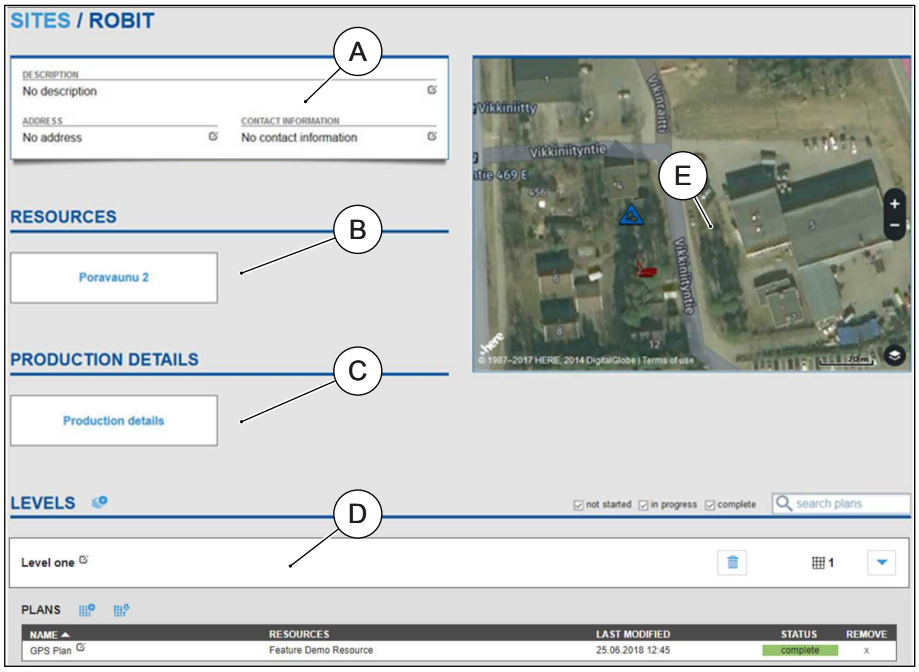
Latest drilling plans are listed in the Drilling Plan overview. You can view the latest drilling plans sorted by their state or measurement time. You can open the selected drilling plan by clicking its name in the plan overview window.

2 Sites view

Open the selected drilling site by clicking its name in the Sites view.



The Sites view consists of the following functions and features:



UI area	Description
A	Site description, address and contact information
B	Resources used in the site (drilling rigs and other equipment)
C	Production details of the site
D	Levels defined for the drilling site, containing drilling plans. Tap on a level to view additional information, e.g. plans included in the level.

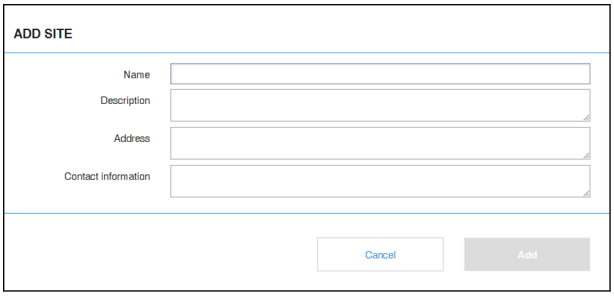
The information in the Sites view can be edited by clicking the Edit icon  beside the information fields.

2.1 Creating a new site

Procedure

1. Create a new site by clicking the New Site icon.

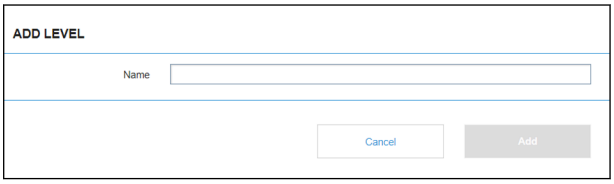
2. Enter site name, description, address and contact information and click Add when ready.



The new site will be displayed in the Sites view. Select the site in order to add levels to it.

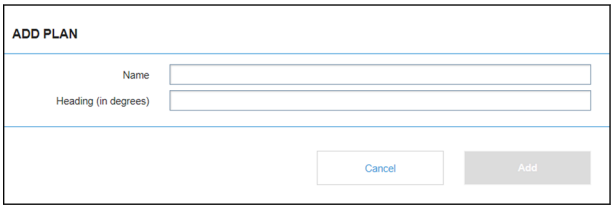
3. Add a new level for the site by clicking the Add Level icon.

4. Enter a name for the level and click Add when ready.



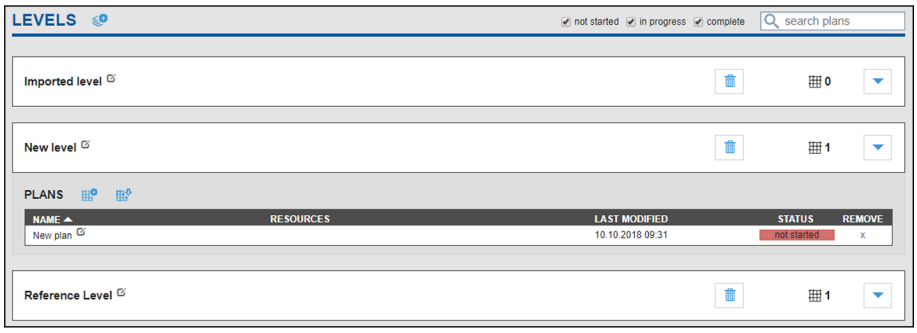
5. Select the level in order to add drilling plans to it.
6. Add a new drilling plan for the level by clicking the Add Plan icon.

7. Enter a name and compass heading for the drilling plan and click Add when ready.



Results

The new level and drilling plan are displayed in the Levels section of the Site view, when the level is selected.



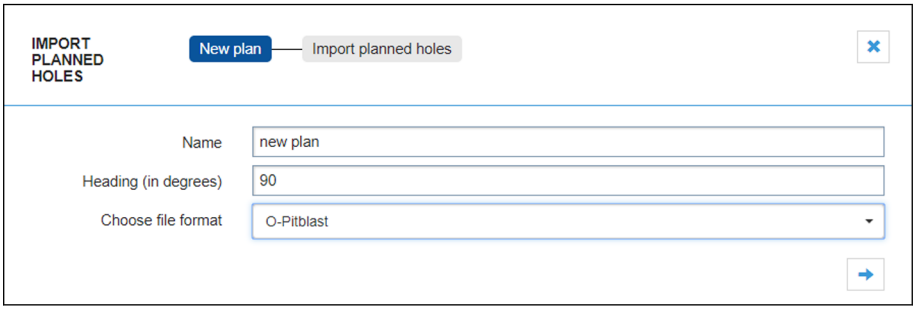
Tip: The site/level/plan hierarchy names can be edited by clicking them, if necessary.

2.2 Importing plans

Procedure

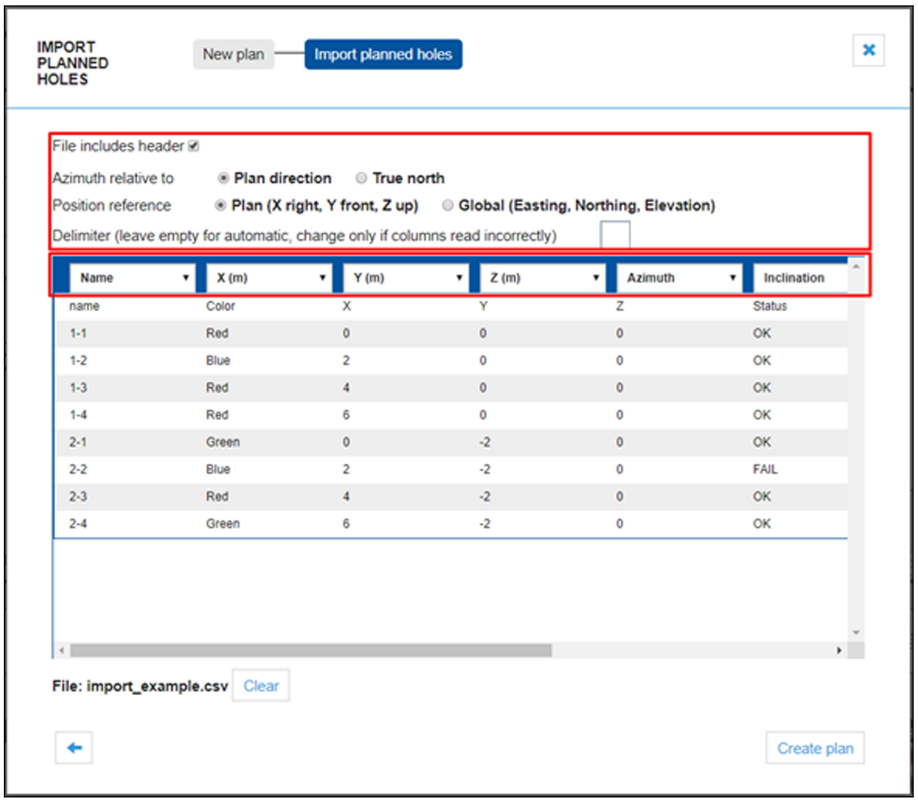
1. Select a drilling site from the Sites view.
2. Tap on a level to view Add/Import plan icons.
3. Click the Import Plan icon on the selected level.

The Plan Import wizard will open.



4. Enter a name and the compass heading for the plan, select the file format to be used, and click Next.

- If the file format chosen was any system specific format *(O-Pitblast or BlastMetriX)*, a file drop/select area will appear.
- If the selected file format is *General CSV*, the file area will turn into a column choosing tool, where you need to match the required data columns to the columns in the file.



a) Select, whether the file contains a header row, which should not be read as a data row.

b) Select, whether the azimuths are relative to the plan's front direction or geographical north.

c) Select, whether the XYZ-coordinates are in a local coordinates or do they represent Easting, Northing and Elevation in some UTM projection.

   In local coordinates Y grows towards the plan's direction, Z grows from down to up, and X grows from left to right completing a right-handed coordinate system.

d) Select the delimiter between the columns in the file, if automatic detection doesn't work for some reason.

e) Match the required and optional data columns to the columns in the file.

Data column	Description
Name	Any short text to be displayed on the hole.
X (m)	The X-coordinate of the planned hole, in meters.
Y (m)	The Y-coordinate of the planned hole, in meters.
Z (m)	The Z-coordinate of the planned hole, in meters.
Azimuth	Azimuth of the planned hole, in degrees.
Inclination	Inclination of the planned hole, in degrees. 0 degrees is straight down, 90 degrees is along the azimuth.
Length (m)	Length of the planned hole, in meters.
UUID *(optional)*	A globally unique id in the UUID format, which identifies the hole. If given, this will be exported in data exports.

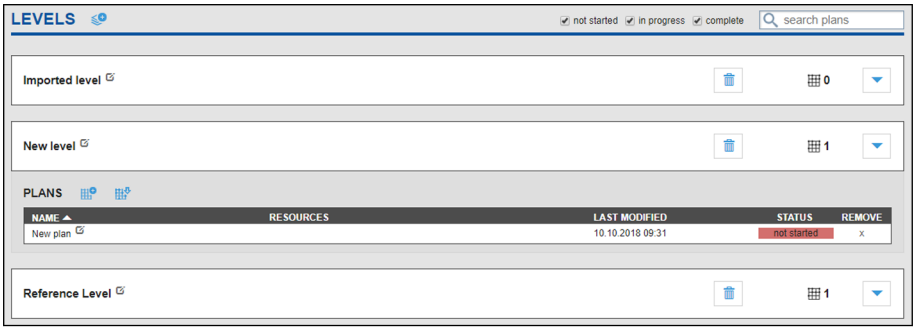
Note: If there are any other columns, they are discarded. In this example, the 'Color' and 'Status' columns are not used by Sense Systems.

5. Drag or choose a file into the file drop area.

   If the selected file format is *General CSV*, the columns are automatically read and displayed.

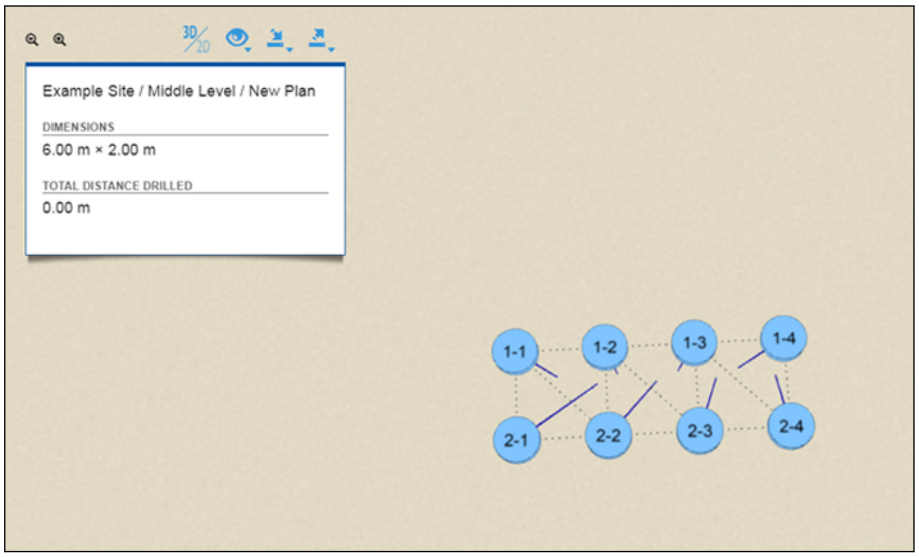
6. Click the Create Plan button to finish.

   The new plan is created, and will be included in the list of plans.



Results

The new plan can now be viewed in the Sense Cloud, and is also available in Sense Tablet's list of plans.



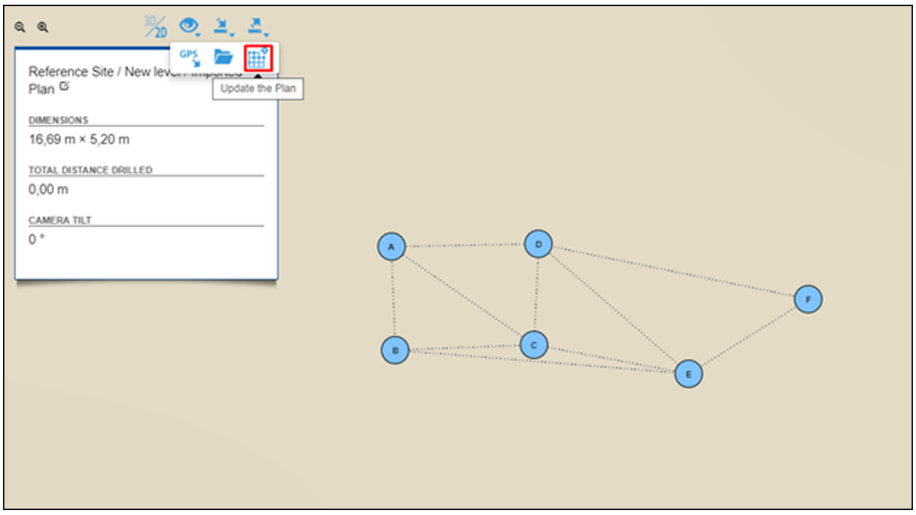
2.3 Updating an imported plan

About this task

Imported drilling plans can be updated, if necessary.

Procedure

1. Click the Update the Plan icon in the plan view.

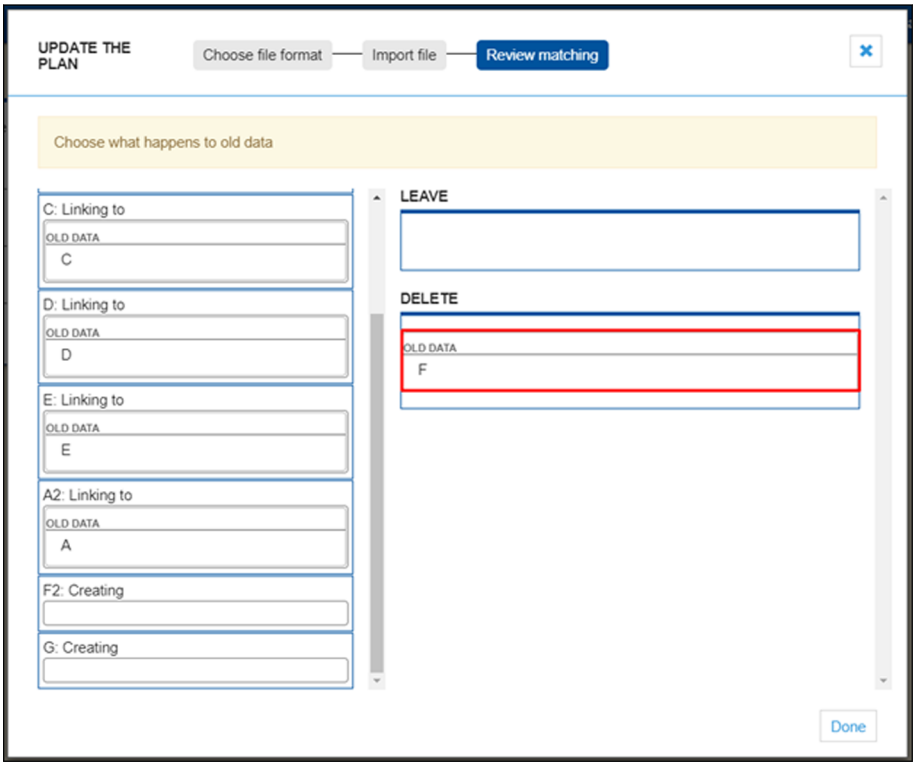


2. Import the file the same way as when creating a new plan from a file.

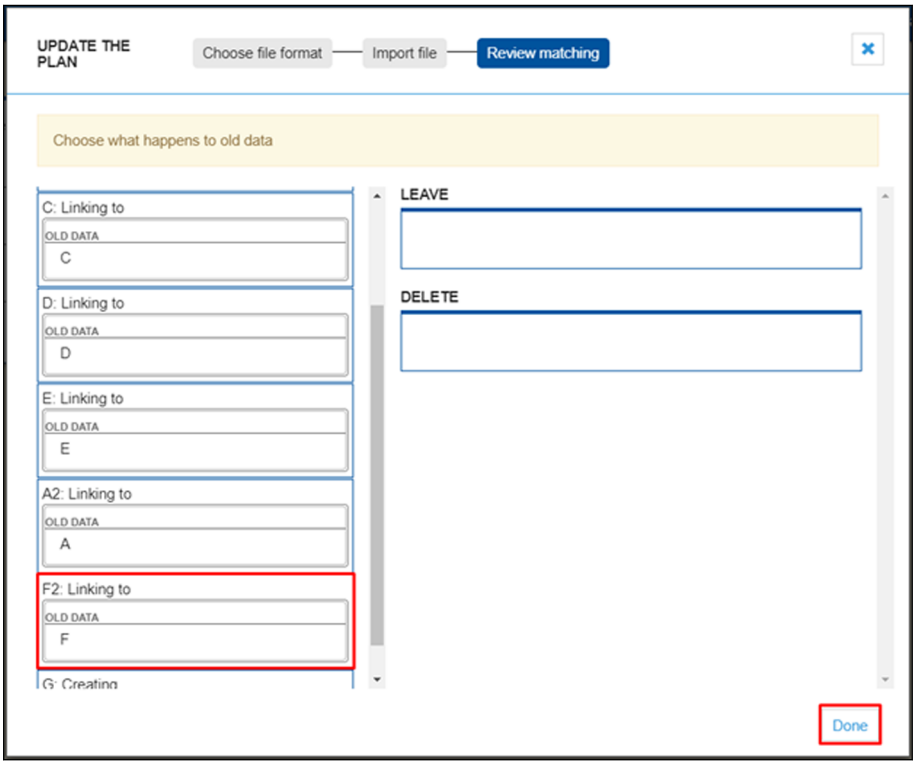
   If the file is successfully imported, a matching step will open. Sense Cloud does its best to match the new, updated, planned holes to the existing ones by looking at their uuids, names and positions. The matching screen shows a suggestion on how to deal with the old data.

   - match old data to new data, making the new planned hole data overwrite the old planned hole data, but keeping any other data, like measurements or GPS positions intact
   - leave the old planned hole data as is, ignoring the new data
   - delete the old planned hole along with any other data attached to it.

In the example case file, hole A has been renamed to A2, hole F has been moved and renamed to F2, and there is a new hole with name G.



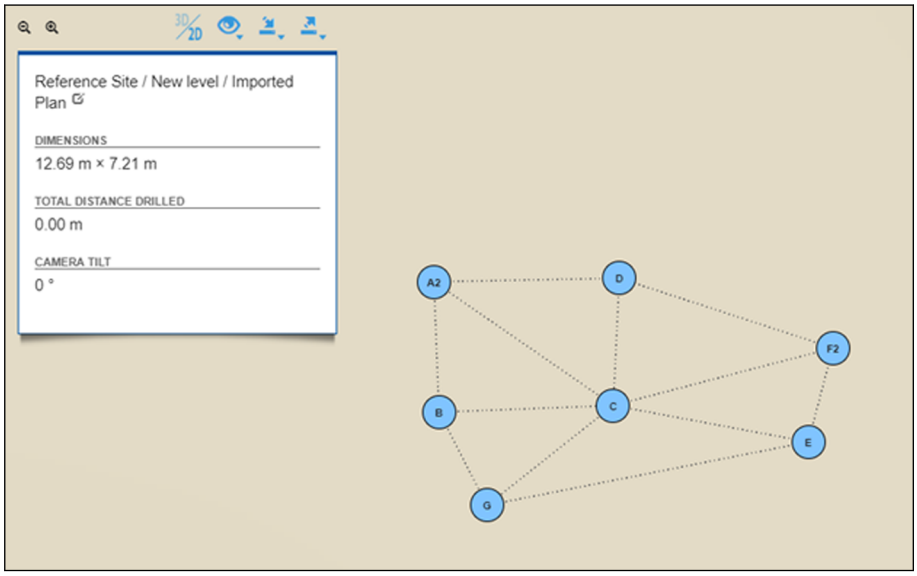
The suggestion links most of the new data to the existing holes. F2 and G are being created as new holes, and F is being deleted. We know that F should be the same as the new F2, so the suggestion has to be corrected by hand. Old data can be dragged and dropped to the different areas.



In the above image F is moved from being deleted to being linked to F2. When done with the matching, click the Done button to make the changes.

Results

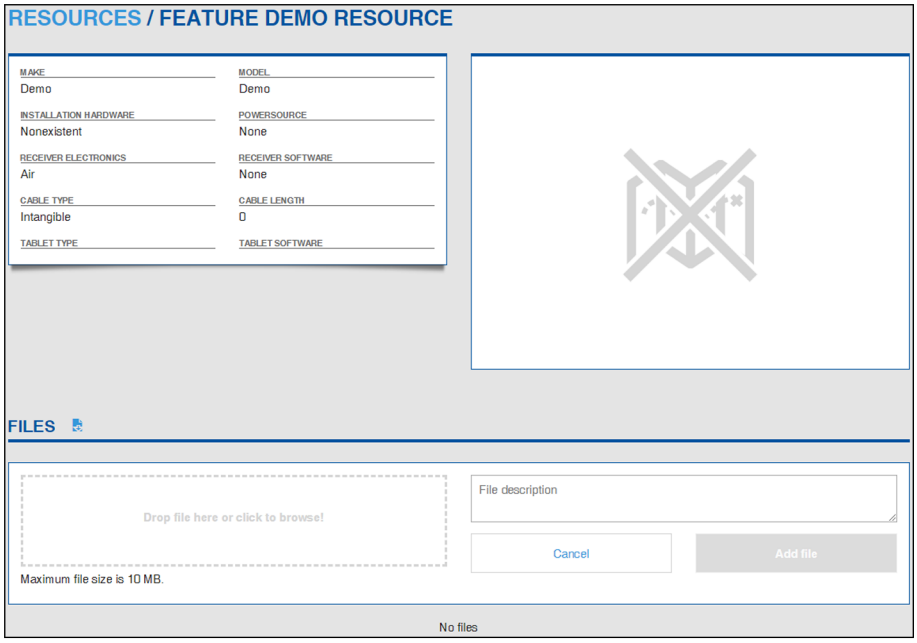
The plan view is automatically updated with the new, updated planned holes.



3 Resources view

You can view the selected resource by clicking its name in the Resources view.

You can, for example, add files or comments related to individual drilling rigs or other equipment on a drilling site.



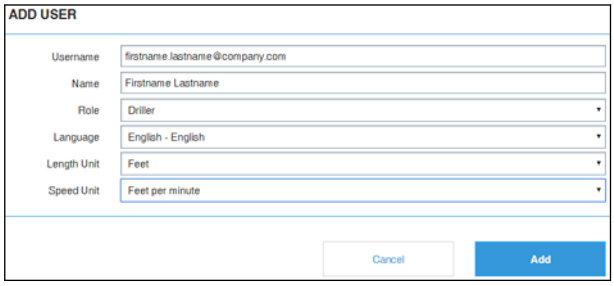
4 Users view

In Users view, you can add or edit users of the Sense Systems Cloud Service. Open an existing user by clicking the username in the Users view.

Note: Only users with Administrator privileges can create, delete, edit and import site/level/plan information.

Click the Add User icon to add new users. 

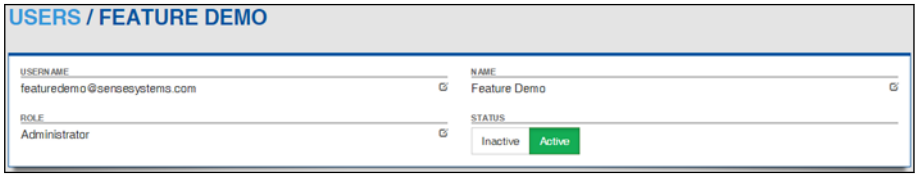
Define the user properties and click Add when ready.



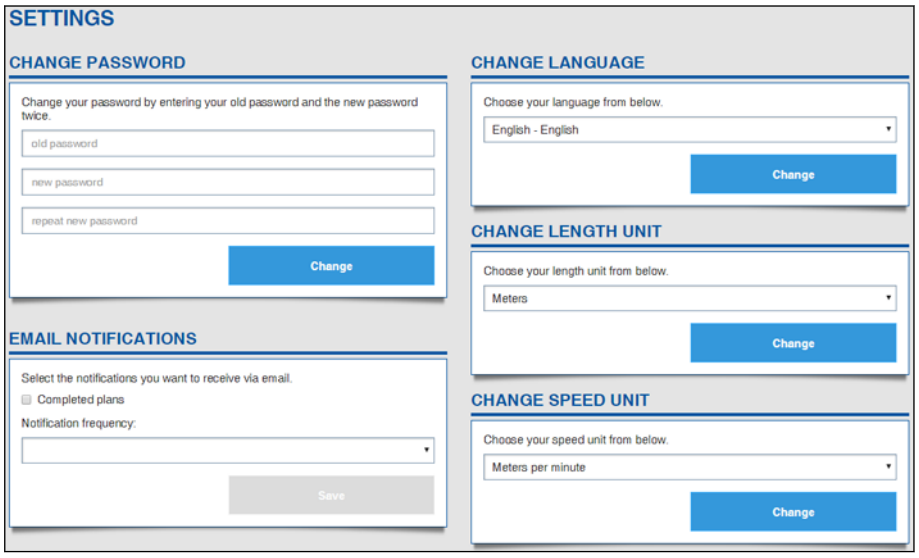
You can define the following properties for each new user:

- Username (email address of the user)
- Name
- Role of the user (Administrator, Management, Charger, Driller)
- User interface language
- Length unit (meters/feet)
- Speed unit (meters per minute/feet per minute)

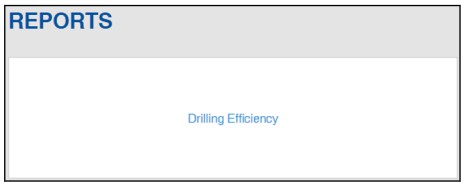
The properties can later be edited or users deactivated, if necessary.



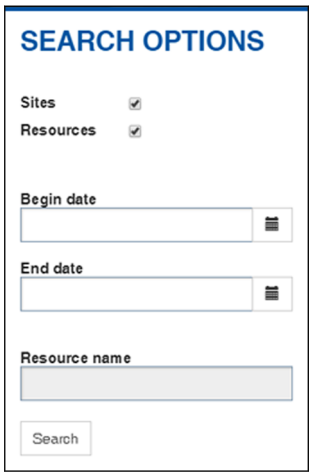
Each user can later change his/her password, language and unit settings by selecting the user name from the top right corner of the main screen.


SETTINGS
CHANGE PASSWORD
Change your password by entering your old password and the new password twice.
old password
new password
repeat new password
Change
EMAIL NOTIFICATIONS
Select the notifications you want to receive via email.
Completed plans
Notification frequency:
Save
CHANGE LANGUAGE
Choose your language from below.
English - English
Change
CHANGE LENGTH UNIT
Choose your length unit from below.
Meters
Change
CHANGE SPEED UNIT
Choose your speed unit from below.
Meters per minute
Change

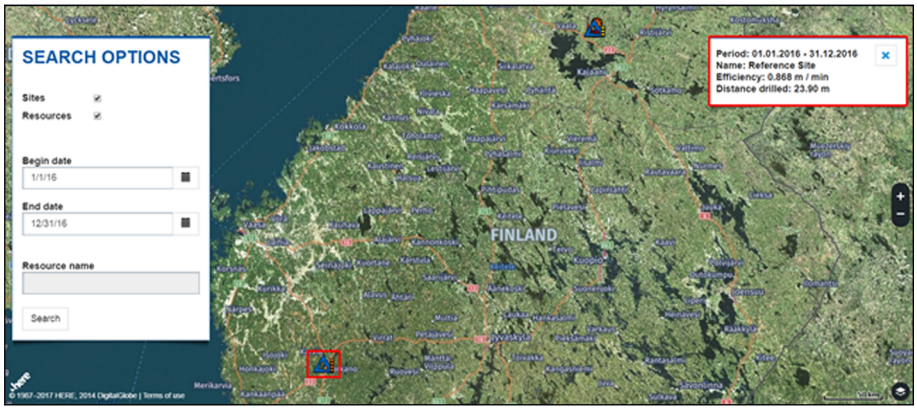
5 Reports view



When you select the Drilling Efficiency report, a map and a search toolbox will be displayed. The search toolbox can be used to search for Sites and/or Resources and their average drilling speeds within a chosen timespan. If the date fields are left blank, the report will cover their whole lifetimes. If only sites are being searched, they can be filtered to only include ones where a certain resource has worked.



If drilling has taken place between the chosen times, the map will show all the sites and resources which have done drilling.



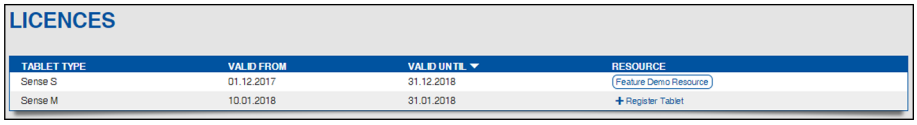
By clicking a site or a resource icon, more information will be presented. The bars next to the site icon represent the average drilling speed on the site in the chosen timespan. The more bars are displayed, the more difficult, i.e. slower, the drilling has been. The resource icon has a speedometer above it indicating how fast the resource has drilled in the chosen timespan. The more right the pointer shows, the faster the resource has drilled.

6 Company view

An administrator user can see the Company view, which is used for viewing company specific settings and information, like tablet licences and API keys.

Licenses

The Licenses area is used for viewing license information and for registering tablet computers to the Cloud Service.



Select an available licence to register the tablet with by clicking the Register Tablet text. If the list does not have an available licence, contact Robit personnel.

API keys

API keys are keys which can be used to authenticate with the programming interfaces Sense Cloud offers. Currently the keys can be used for the export API.

API keys can be created and deleted, and the administrator can distribute them as they see fit. When a key is deleted, it can no longer be used for authentication.

The Export API function can be used to export the same files as in the drilling plan data export view, using the system-specific configurations or ones made by the customer. The documentation for the export API (in English) can be found at *https://sensesystems.com/apiDocuments/exportapi.html*.

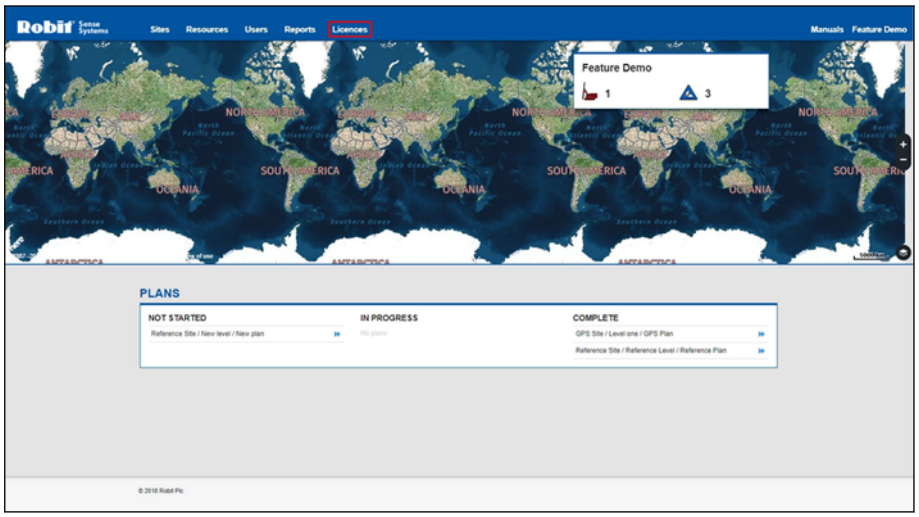
Company logo

A company's own logo, which will be shown on the front page and in borehole reports can be set here. To set the logo, click on the Set Company logo button.

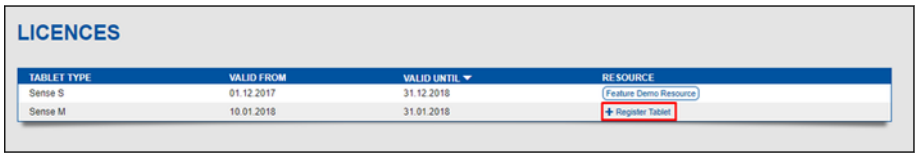
Drop an image onto the drop area.

6.1 Registering a tablet

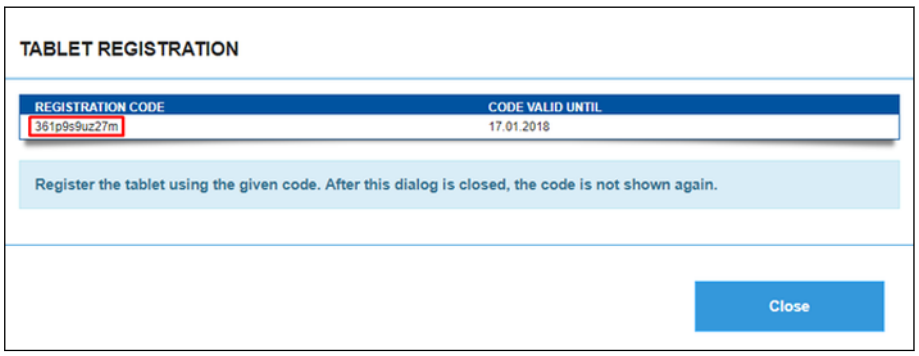
If the tablet computer's measurement software asks for a registration code, log into *https://www.sensesystems.com* with your credentials and go to the *Company* view.



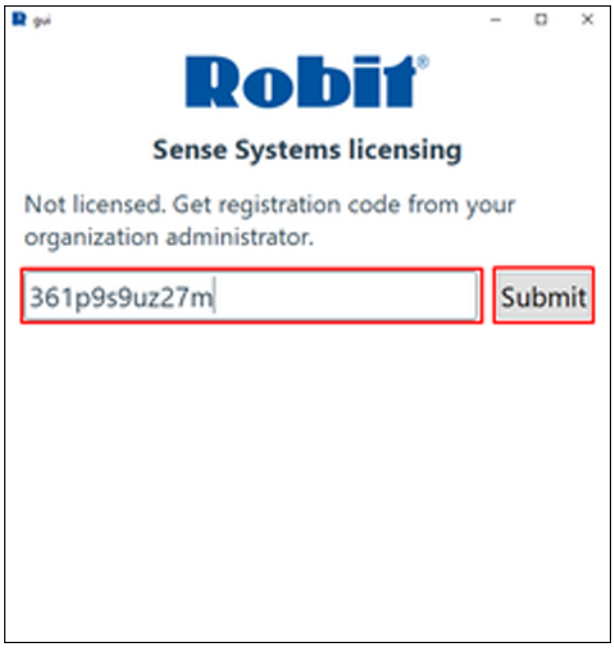
You will see a list of licences. Select an available licence to register the tablet with by clicking the Register Tablet text. If the list does not have an available licence, contact Robit personnel.



A window with a registration code will open.



Write or copy the code into the registration code field on the tablet computer's Measurement UI Software. Click Submit to send the code.



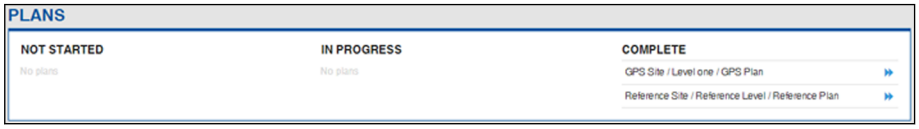
Review your licence information on the tablet computer and click Proceed to start using the software.

7 Manuals

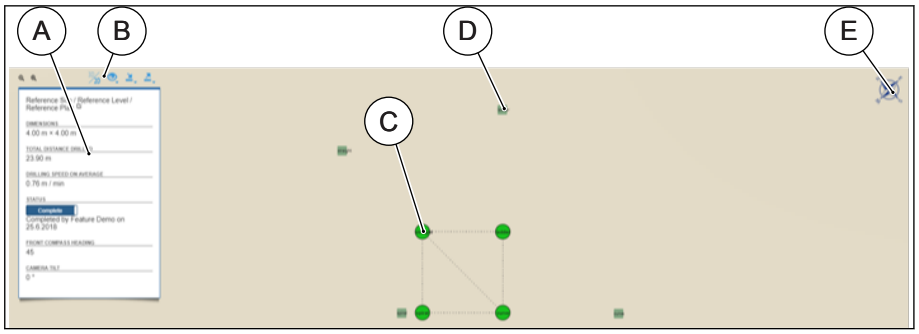
The Manuals view provides online access to Sense Systems product documentation.

8 Drilling Plan view

Drilling plans are listed in the Drilling Plan overview. You can open the selected drilling plan by clicking its name in the plan overview window.



The Drilling Plan view contains the following information:

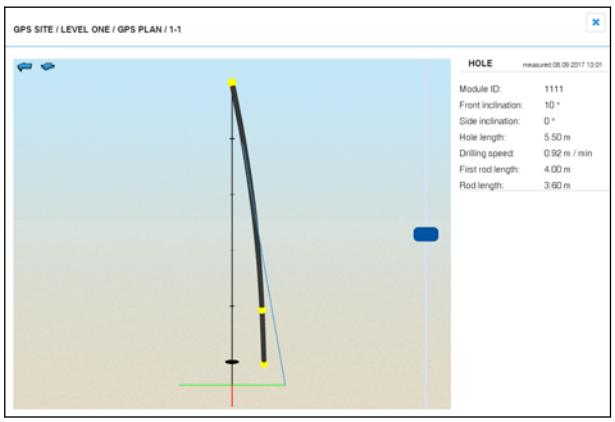


UI area	Functions	UI area	Functions
A	Drilling plan overview	D	Hole end point
B	View controls / data management	E	Plan orientation
C	Hole starting point • GREEN: GPS data not available • RED: GPS location measured • BLUE: imported hole • GREY: no measurement		

Note: You can change the status of the drilling plan by clicking the status button in the drilling plan overview. If you change the status to 'Complete', the date is displayed in the drilling plan overview.

Hole view

Individual boreholes can be examined by selecting a hole from the Drilling Plan view.



The following notifications about problems in borehole measurement are possible:

Error message	Description
AzimuthUnreliable	The Azimuth measurement is not reliable.
TooVertical	Hole is too vertical for accurate Azimuth measurement.
CorruptAcceleration	Acceleration data is corrupt.
TooFastRotations	Too fast rotations during borehole measurement.

These notifications are also included in exported borehole reports.

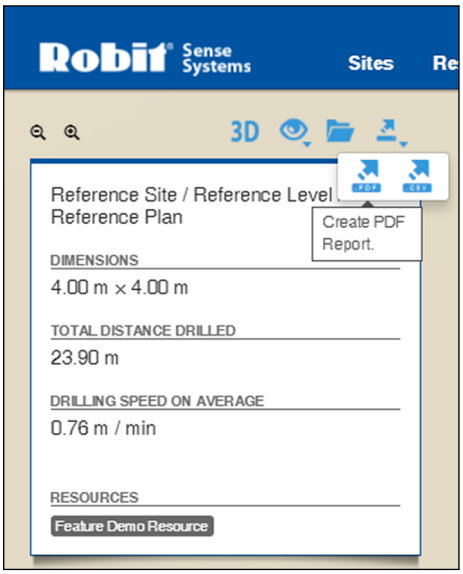
8.1 Exporting borehole reports

About this task

Borehole reports can be exported to .pdf files using Sense Cloud.

Procedure

1. Go to Plan view Sites[select site][select level][select plan]. Choose the PDF export icon to open the Export Wizard.



2. Select the holes to be included in the borehole report and click the Proceed icon to create the report.

Results

The borehole report is created.

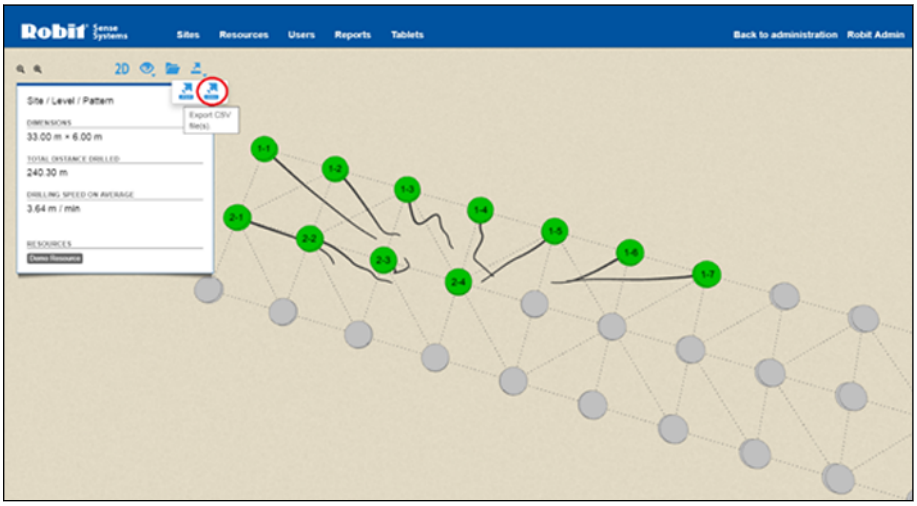
8.2 Exporting plans

About this task

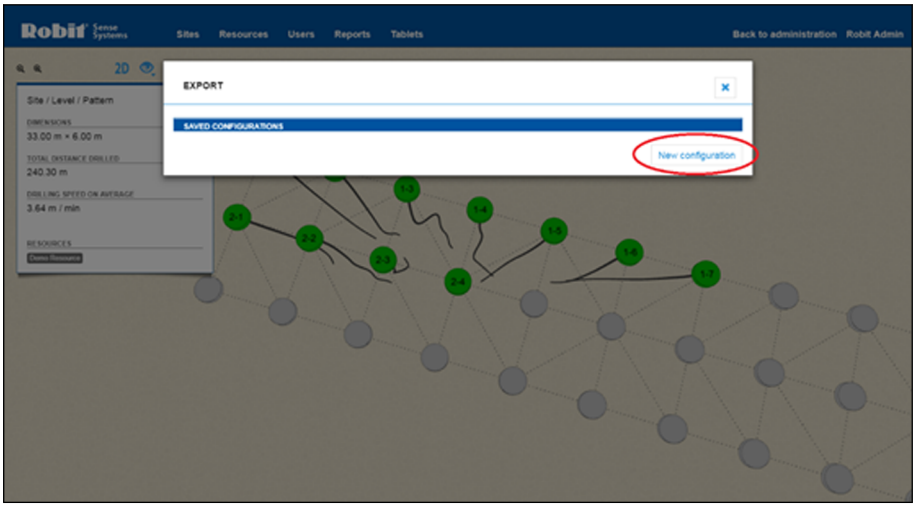
The Export Wizard is used to manage configurations of CSV exports. A configuration contains the exported columns, their order and the separator, as well as the information whether the whole Plan is exported into the same file, or each borehole's information into its own file. If boreholes are split into their own files, the exported file is a zip containing all of the holes' files.

Procedure

1. Go to Plan view Sites[select site][select level][select plan]. Click the Export CSV file(s) icon to open the Export Wizard.

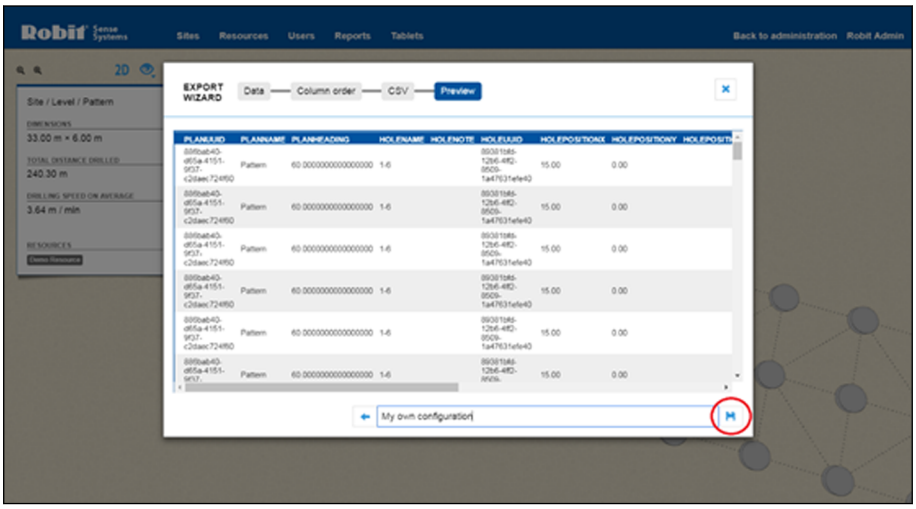


2. Select a saved export configuration or click New configuration to create a new export configuration.



The wizard will ask all the needed information for the configuration, and will finally present a preview of the data this configuration would export.

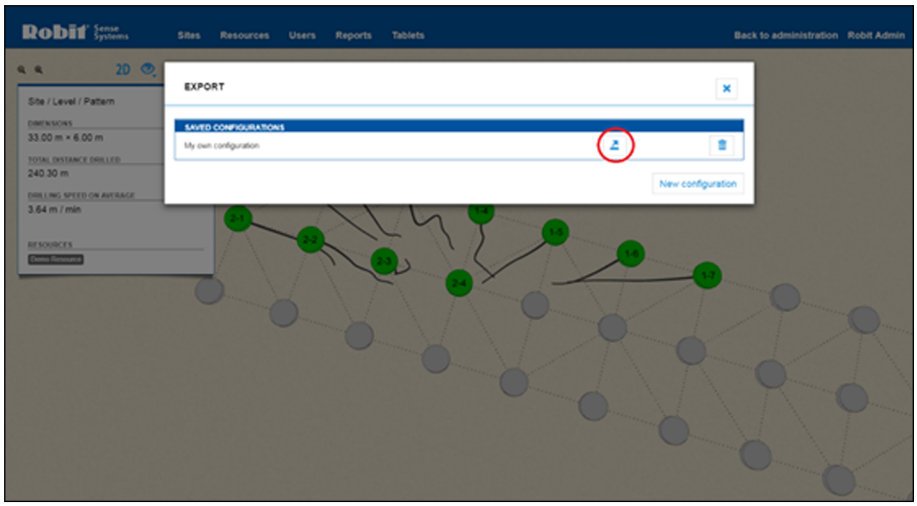
3. Give a name to the configuration, and click the Save button.



The wizard will ask whether you want to export a file using the new configuration straight away.

Results

The configuration is now saved and can be used by clicking the Export button next to its name. The configuration is visible and usable by anyone under the same company as you.



8.2.1 Data interpretation

The CSV file format does not have any hierarchy, but the exported data is hierarchical on three levels (Field, Borehole, Measurement). This means that the data of upper levels will be duplicated. For example, if a borehole has five measurements, each measurement will be on its own line, and the borehole's information will be repeated on all the lines. In the same way the field's information will be the same on every line of the exported file.

Azimuth and inclination define the borehole's direction at the given position. Only the directions of the holes at measured positions are known, not the actual shapes. The shape is estimated from the directions using numerical integration. The Sense system assumes that between the measurement positions the hole curves smoothly and uniformly from the previous measured direction to the next.

GNSS positions in the same export are always given in the same UTM projection, but the exact projection is not known. This means that the hole's position on Earth cannot be known from the file alone.

GNSS position and local collar position data might conflict, if both are available.

Table 1: Sense Systems CSV export data specification

Field data	
UUID	Globally unique id in the UUID format.
Name	Name of the pattern.
Heading	Geodetic heading of the pattern, in degrees.

Hole data	
UUID	Globally unique id in UUID format.
Name	Name of the hole.
Note	Note attached to the hole.
Planned Hole Geodetic Azimuth	The geodetic azimuth of the possible imported planned hole.
Collar Geodetic Azimuth	The geodetic azimuth at the hole’s collar.
Local collar X	Hole’s left-right starting position in the field’s local coordinates, in meters. Values increase from left to right.
Local collar Y	Hole’s front-back starting position in the field’s local coordinates, in meters. Values increase from back to front.
Local collar Z	Hole’s up-down starting position in the field’s local coordinates, in meters. Values increase from down to up. May be unknow.
GNSS northing	Hole’s starting position northing in a UTM projection. May be unknow.
GNSS easting	Hole’s starting position easting in a UTM projection. May be unknow.
GNSS elevation	Hole’s starting position elevation in a UTM projection. May be unknow.

Measurement data	
Geodetic Azimuth	The geodetic azimuth of the measurement point.
Magnetic Azimuth	The magnetic azimuth of the measurement point.
Inclination	The amount of tilt of the hole towards azimuth at the measurement point, in degrees. 0° is straight down, 90° is along the azimuth.
Position	The position of the measurement point, in meters. Measured along the hole from its starting point.

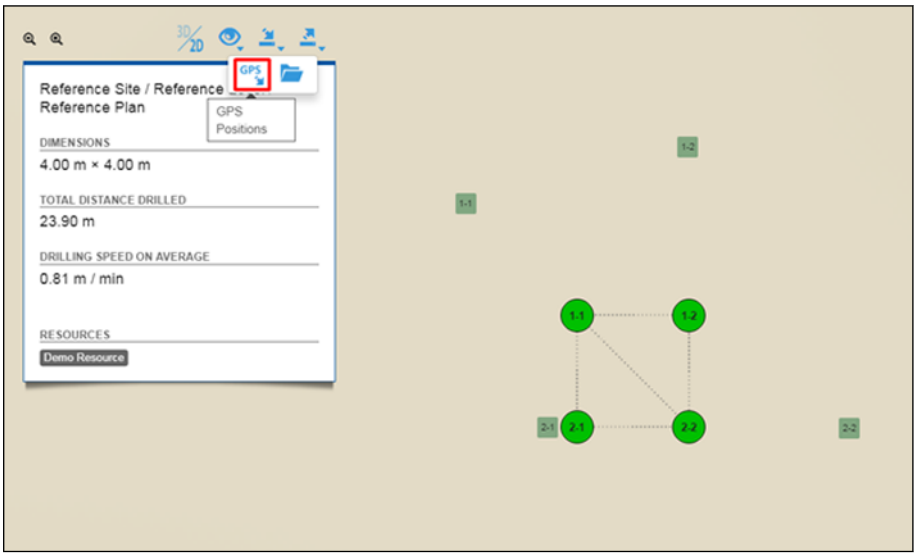
8.3 Importing GPS positions

About this task

GPS position data can be imported for boreholes using Sense Cloud.

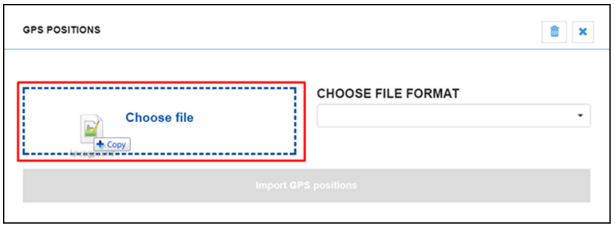
Procedure

1. Go to Plan view Sites[select site][select level][select plan]. Click the GPS import icon under the import icon.

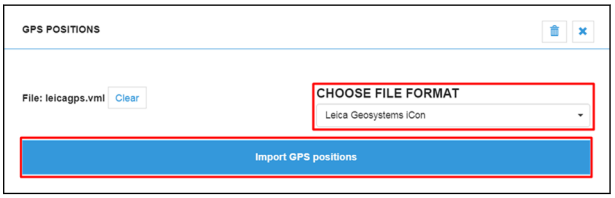


An import window opens with a file drop area and a dropdown menu for choosing the file format.

2. Drag and drop or choose a file into the file drop area.



3. Choose the file format (or source system) of the file, and click the Import GPS positions button.

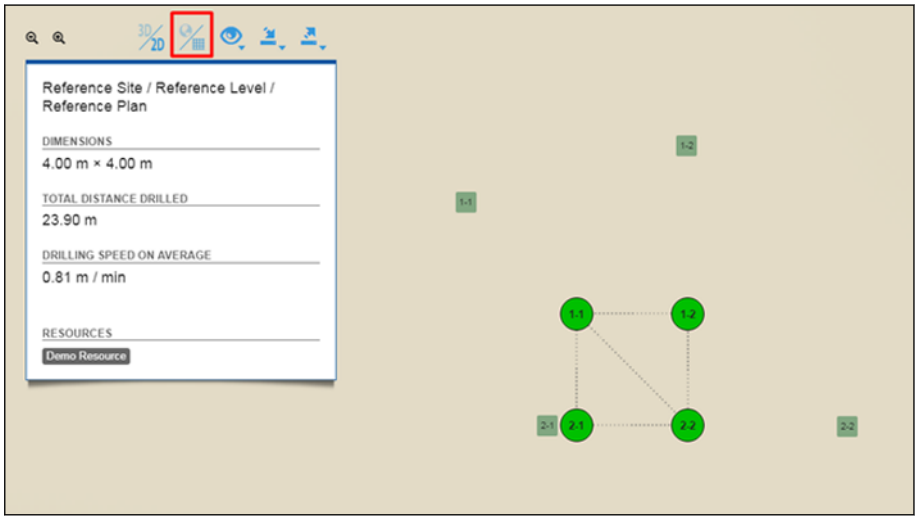


At the moment, the GPS import feature accepts four different file formats: Leica Geosystems iCon, Leica Rover, Sandvik SanRemo, and Atlas Copco Surface Manager. Leica Geosystems iCon and Sandvik SanRemo files use strict timestamp matching, and Atlas Copco Surface Manager uses name matching. Leica Rover uses time order matching.

Note: Imported GPS positions can be deleted from the same import window using the trashcan icon.

Results

If there are no errors in the imported file, the window closes. A new icon becomes available on the toolbar for toggling between the previous local positions and the imported GPS positions. Clicking the toggle button will show the GPS positions of the holes on the plan. Plan dimensions also update based on the toggled mode.



Note: If you try to import more positions on a Plan which already has GPS data, you will be prompted if the old data should be overwritten.

8.3.1 Sense Systems GPS import matching

There are three ways by which starting locations are matched with Sense holes: strict timestamp match, time order match and name match.

Strict timestamp match looks at the imported data in order, and matches each position's timestamp with the Sense hole which has timestamp closest to it, but not further than 5 minutes, and has no prior GPS position data. If there are no positionless Sense holes with timestamps within 5 minutes of the imported position, the position is discarded.

All the Sense holes on the Plan must have position data attached to them with the timestamp match, or the import fails. There can, however, be more GPS positions in the imported file than there are Sense holes on the Plan, in which case some of the imported positions just won't match to any hole.

Time order match puts the timestamps of both the Sense holes on the Plan and the positions in the imported file in order. Then they are matched by index (first with first, second with second, …). Time order matching requires that there are exactly the same number of holes on the Plan and positions in the file.

Name match matches the positions to holes by name. Name match doesn't require there to be GPS data for all the holes.