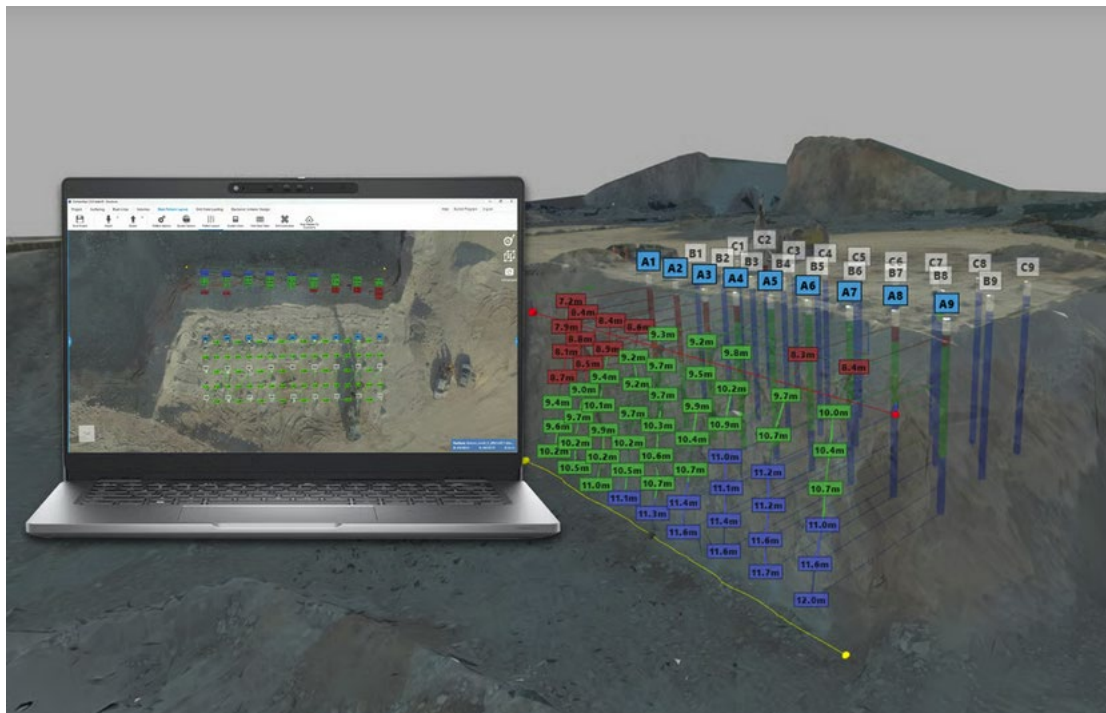


BlastOPS

Software user manual

Version 1.02



Contents

Introduction	4
1 Customer information	5
BlastOPS	6
2 BlastOPS	7
Cloud Processing	11
3 Cloud Processing introduction	12
4 Screen Layout	13
5 Project ribbon	15
6 Point Clouds ribbon	17
7 Measurements ribbon	29
8 Surfacing ribbon	30
9 Collars ribbon	32
Blast Design	33
10 Blast Design introduction	34
11 Screen Layout	35
12 Global Hole Settings	39
13 Hole Tools	46
14 Project ribbon	51
15 Surfaces ribbon	53
16 Lines ribbon	56
17 Holes ribbon	60
18 Volumes ribbon	67
19 Loading ribbon	69
20 Timing ribbon	73
21 Reports ribbon	79

Introduction

1 Customer information

1.1 Carlson Software

Founded in 1983, Carlson Software specializes in CAD design software, surveying hardware, and machine control products for the land surveying, civil engineering, construction, and mining industries worldwide, providing one-source technology solutions from data collection to design to construction.

BlastOPS is designed and developed with Carlson's world-class levels of detail, quality and innovation.

Carlson's renowned dedication to customer service is unique in the industry. For any technical support issues related to your software contact us directly or, alternatively, contact your local Carlson-approved support centre.

BlastOPS supports a range of Carlson hardware and software products such as the Quarryman laser profiler, the Boretrak hole deviation survey probe, the Viking GNSS system, Carlson PhotoCapture drone photo processing software and Carlson's Machine Control solutions.

Details of all related Carlson products are detailed on our website: www.carlsonsw.com.

1.2 User manual

BlastOPS is designed to be user friendly and intuitive to use. However, we strongly recommend that you undergo a training session with a Carlson-approved trainer before using **BlastOPS** for a real-world project. This user manual explains the functionality of the software but is intended to support the knowledge acquired in a training course, rather than to act as a substitute for training.

This document has been compiled with care. However, should you discover any errors, we would be grateful if you could contact Carlson directly.

Although every effort will be made to update the manual alongside updates to the software, the information in this manual is subject to change without notice.

Reproduction of this document in whole or in part, including utilisation in machines capable of reproduction or retrieval, without the express written permission of Carlson is prohibited. Reverse engineering is also prohibited.

For any feedback or comments, or if there are questions about the Boretrak which are beyond the scope of this manual, contact Carlson Software.

1.2.1 Manual version

The document number of this manual is v.1.02, compiled in June 2026.

The manual is based on **BlastOPS** version 2.5.4.

Updates to manual v.1.02:

- Incorporated updates to **Cloud Processing** module, in parallel with release of **Quarryman Studio**.
- Additional advice on coding Quarryman data (section 6.3.1 and 6.3.3).

1.3 End User License Agreement

The **BlastOPS** End User License Agreement (EULA) is available online from the Carlson Software website.

BlastOPS

2 BlastOPS

BlastOPS is a complete blast design software package. It can be used in both simple and comprehensive blast designs and can be paired with traditional survey methods – such as the use of a tripod-mounted Quarryman Laser Profiler – as well as with drone surveys – which might be processed by Carlson Photo Capture – for a complete bench production workflow.

Using **BlastOPS** helps to improve blasts with better rock fragmentation, lessens the risk of fly rock, and lowers operational costs. **BlastOPS** supports the precision and calculation necessary for the utmost blast efficiency. Work with point clouds to develop meshes, create blast pattern layouts, and ensure proper burden and borehole spacing for more productive blasting and project site optimization.

BlastOPS connects pre and post-blast design workflows and provides the tools to map, design, measure, and manage your blasts from planning to ignition.

2.1 Recommended specs

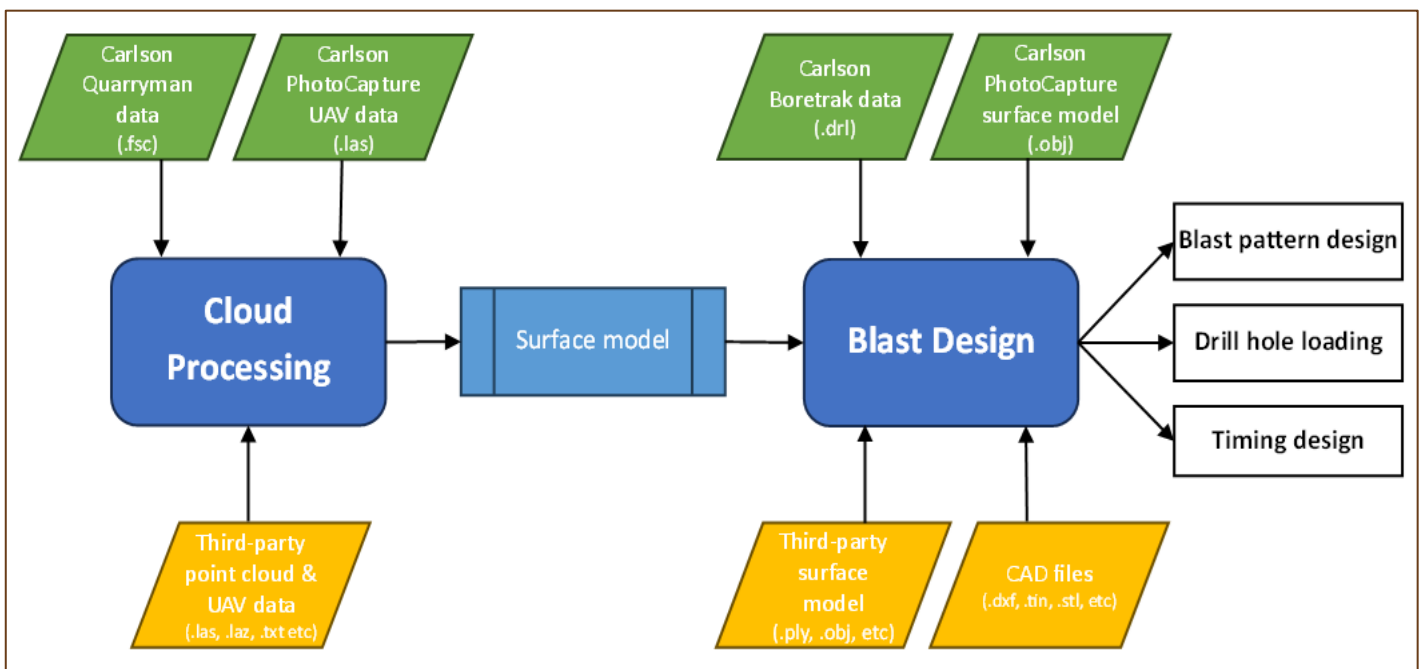
Most modern PCs will run **BlastOPS** perfectly well. However, to ensure optimum performance, we do recommend that the machine does meet the following basic specs:

- Run Windows 10 and above
- CPU: Intel i7 / Ryzen 7
- RAM: 16 GB
- GPU: RTX 3050 or equivalent card with at least 6 GB of VRAM

2.2 Cloud Processing v Blast Design

BlastOPS is split into two distinct modules: **Cloud Processing** and **Blast Design**.

The module in which you start depends on the raw dataset that will form the basis of your project.



Blast Design provides all the functionality to design and analyse your blast. To use this functionality, **Blast Design** must begin with a 3D surface file (OBJ, GLTF, GLB, DXF, TIN, STL, or PLY). If you are starting with a dataset in one of these formats, jump straight to **Blast Design**.

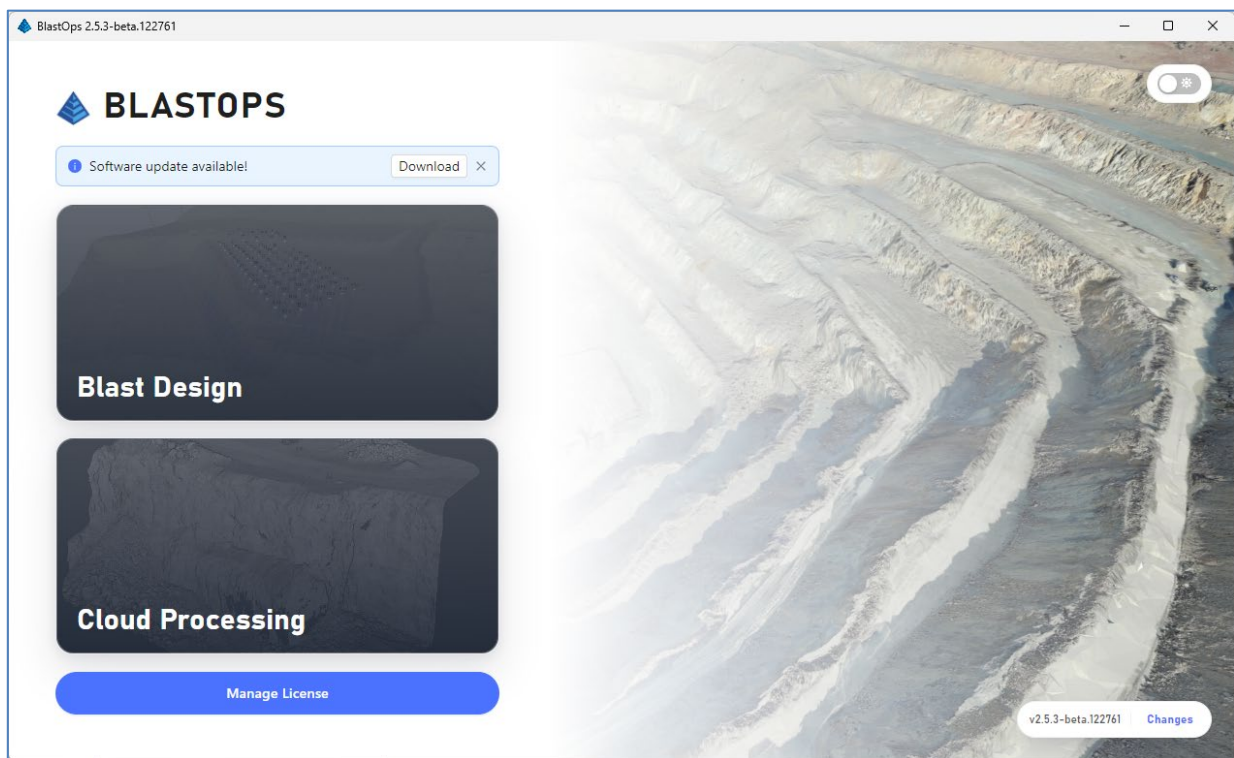
If you are starting with a raw point cloud or a Quarryman data file (FSC, LAZ, LAS, XYZ, or TXT), then this data must first be converted into a surface file before it is loaded into **Blast Design**. In this case, start in **Cloud Processing**. This module provides tools to process raw point data into a 3D surface file. The newly generated surface file can then be transferred straight into **Blast Design**.

From **Blast Design**, the data is analysed and processed to produce blast pattern designs, drill hole loading plans and blast timing schedules.

Note that the functionality in **Cloud Processing** is available as a separate, stand-alone package **Quarryman Viewer** which is supplied with Quarryman Pro instruments for basic processing of the raw FSC file.

2.3 The Home screen

On starting **BlastOPS**, the **Home** screen appears.



2.3.1 Software version

The title bar displays the current **BlastOPS** version and build number.

If your computer is connected to the internet, and a new version of **BlastOPS** has been released, a message appears: **Software update available!** Click **Download** to download the installer for the new version.

The latest version of **BlastOPS** is also available from the Carlson Software downloads web page here:

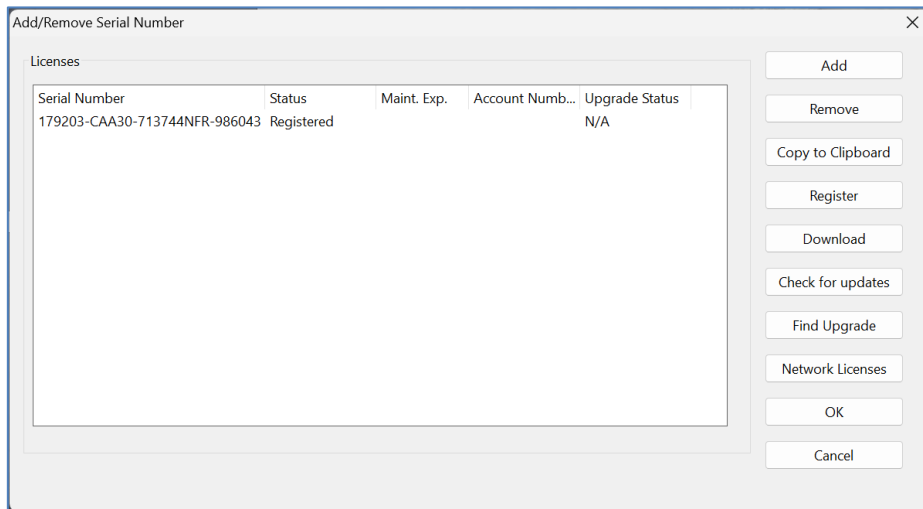
<https://web.carlsonsw.com/files/updates/updates05.php>

Select **BlastOPS** from the drop-down list and download the installer.

A change log outlining the changes made to each version is available in the bottom right of the **Home** screen.

2.3.2 Licensing

Press the **Manage License** button at the bottom of the **Home** screen to open the Carlson licensing dialog window.



If the window does not open in front of the main **BlastOPS** window, navigate to the Windows taskbar and hover over the **BlastOPS** logo to bring the licensing window to the front.

Add and remove serial numbers by clicking the associated button and following the prompts that open.

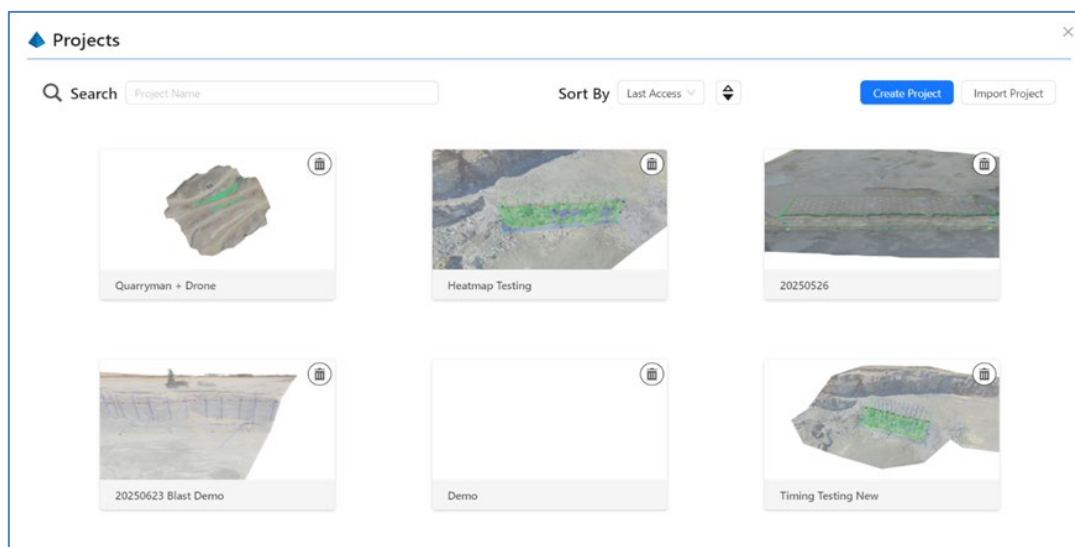
For further information about licensing your copy of **BlastOPS**, please contact your local Carlson representative.

From the **Home** screen, select the module you wish to run.

2.3.3 Managing Projects

After selecting **Cloud Processing** or **Blast Design**, the **Project Selection** window appears.

The **Project Selection** window shows a list of all existing projects with names and thumbnails.



From this window, create, import, open, and delete projects.

Open a project by clicking the project's associated thumbnail.

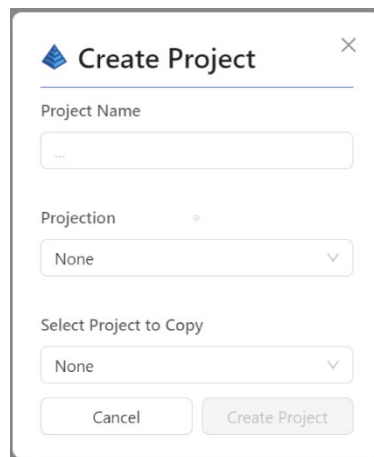
To search for a specific project, write the project's name in the search bar.

By default, projects are sorted by 'last accessed'. To change how the project list is sorted, use the **Sort By** drop-down list to switch between **Last Access** and **Alphabetical**. Click the sorting direction button next to the drop-down list to toggle between ascending and descending order.

Delete a project by pressing the trash can icon in the top right of the project's thumbnail.

On the top right of the window there are two buttons:

- **Import Project.** Click to import a **BlastOPS** project zip file from your PC. This is useful when sharing a project between two users.
- **Create Project.** This prompts the **Create Project** window.



The 'Create Project' dialog box is a light gray window with a title bar containing the Carlson logo and the text 'Create Project' with a close button (X). It contains three input fields: 'Project Name' (a text box with a placeholder '...'), 'Projection' (a dropdown menu with 'None' selected), and 'Select Project to Copy' (a dropdown menu with 'None' selected). At the bottom are two buttons: 'Cancel' and 'Create Project'.

Enter a **Project Name** and, if required, a **Projection**.

Optionally, use the **Select Project to Copy** drop down list to select another existing project to copy and use as a starting point for the new project.

Click **Create Project** to create and open the new project.

The default location on your PC for all **BlastOPS** project files is: **C:\ProgramData\BlastCommander\Projects**.

Cloud Processing

3 Cloud Processing introduction

Cloud Processing is the point cloud editing and surfacing module of **BlastOPS**. Its primary purpose is to transform point clouds and scan data into a 3D surface that can be processed by **Blast Design**. If you already have a 3D surface file, skip **Cloud Processing** and go straight to **Blast Design**.

Usually there are three or four steps to go through in **Cloud Processing** before exporting to **Blast Design**:

- 1) Import the point cloud file.
- 2) If a Quarryman FSC file has been imported, process the survey to generate an adjusted point cloud.
- 3) Edit the point cloud by removing unwanted areas and adding patches to close holes in the data.
- 4) Surface the point cloud.

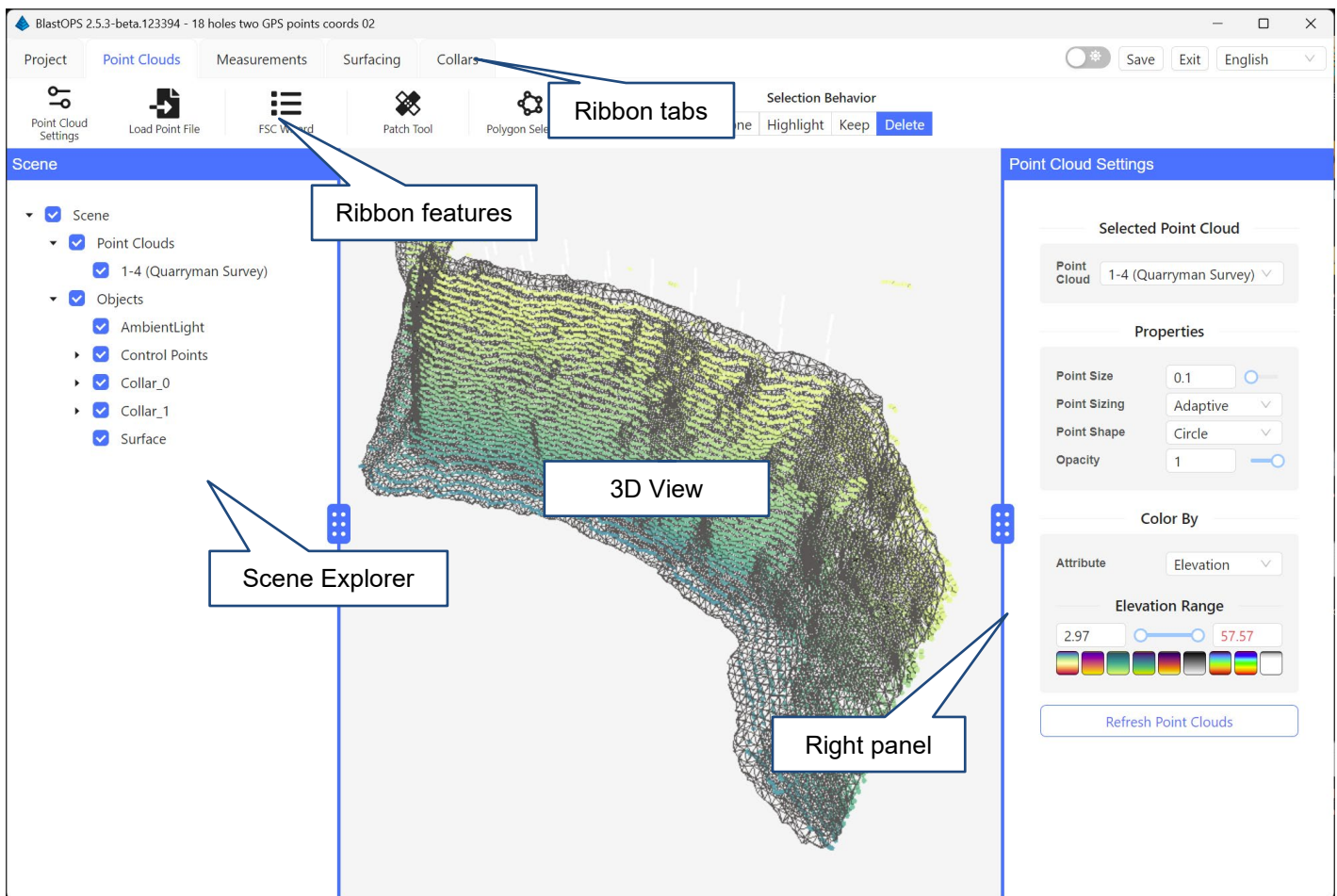
The following sections cover specific features of **Cloud Processing**. This includes a general overview of the user interface as well as specific descriptions of each tool in the **Cloud Processing** module.

4 Screen Layout

On creation of a new **Cloud Processing** project, the main window appears.

A standard screen layout is composed of the elements outlined below.

- **Ribbon Tabs:** tabs at the top of the screen, ordered by functionality.
- **Ribbon Features:** the buttons and other controls under the selected ribbon tab.
- **3D View:** the main part of the screen where active data is displayed.
- **Scene Explorer:** collapsible panel on the left side of the **3D View** showing all elements in a project.
- **Right Panel:** collapsible panel on the right side of the **3D View** showing context-dependent functionality.



4.1.1 Ribbon tabs

Ribbon tabs are used to organize **Cloud Processing** by feature/use case. The tabs are positioned left to right in an order that matches the normal processing sequence of a **BlastOPS** project.

On the far right side of the **Ribbon tabs** are controls that are shared between both **Cloud Processing** and **Blast Design**.

- **Theme:** toggle between light and dark mode.
- **Save:** save the project's current state.
- **Exit:** open the **BlastOPS Home** screen to select **Cloud Processing** or **Blast Design**.
- **Language:** change which language the program uses.

4.1.2 Ribbon features

Ribbon Features are the buttons and other controls under a given tab.

Each tab and its associated features will be covered in depth throughout this manual.

4.1.3 Scene Explorer

The **Scene Explorer** occupies the left panel. The **Scene Explorer** acts as a 'project tree' showing all data in the active project.

Tools in the **Scene Explorer** allow you to navigate the 3D data currently loaded in the **3D View**.

Right-click on items in the list to open context menus with actions specific to the item clicked.

4.1.4 Right panel

The **Right panel** shows information about the current selection in the scene.

Both of the side panels can be opened and closed using the blue handle on the associated side. More information about specific panels can be found below.

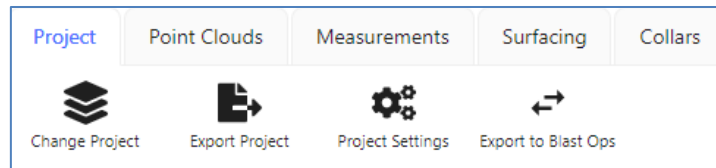
4.1.5 3D View

The **3D View** is the core of **Cloud Processing** and **Blast Design**. It is always located in the centre of your screen. This is where all 3D data is displayed.

To facilitate precise viewing of the data in the **3D View**, use the following controls:

- **Zoom in/out:** roll the scroll wheel when on a mouse.
- **Rotate:** click and drag with the left button on a mouse.
- **Pan:** click and drag with the right button on a mouse.

5 Project ribbon



5.1 Change Project

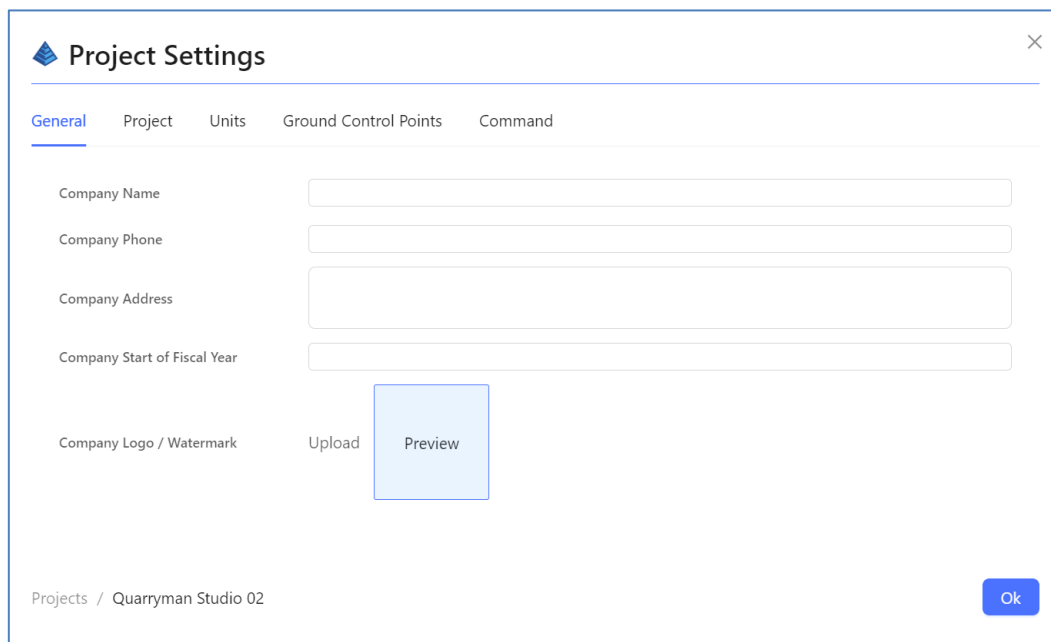
Click **Change Project** to switch **BlastOPS** projects.

5.2 Export Project

Click **Export Project** to create a compressed (ZIP) file of the entire project for importing onto other PCs.

5.3 Project Settings

Click **Project Settings** to open the **Project Settings** window.



Use the **Project Settings** window to configure various project-level settings. The settings are arranged by tabs.

5.3.1 General

Input company information such as name, phone, address, and logo. These fields will be used by the report generator to customise deliverables from **BlastOPS**.

5.3.2 Project

Enter site name, operator name, and project notes as required. These fields will be used by the report generator to

customise deliverables from **BlastOPS**.

5.3.3 Units

Define the **Units** and projection system used by the **BlastOPS** for this project only.

Note that a projection system is required to show satellite images in **Blast Design**.

5.3.4 Ground Control points

Ground Control Points are required to process data from a Quarryman unit. These points can be added, imported, edited, and removed using this tab.

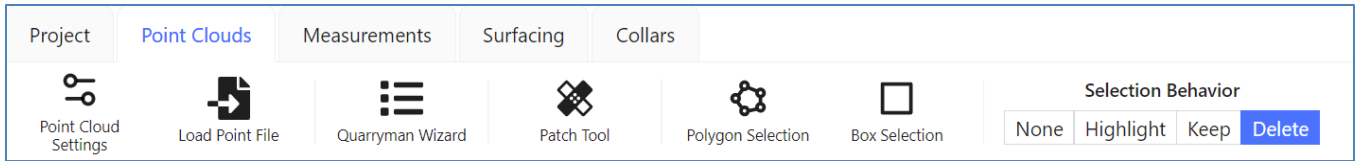
5.3.5 Command

Enter **Carlson Command** login information. This allows a user to connect to **Carlson Command** in order to transfer data between the office and field.

5.4 Export to Blast Design ↔

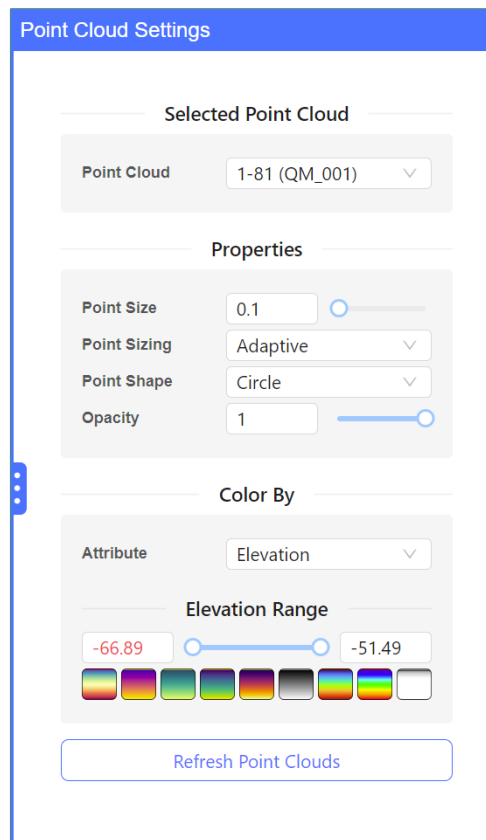
Click **Export to Blast Design** to export objects in the **Cloud Processing** project into **Blast Design** for blast pattern design, analysis and reporting.

6 Point Clouds ribbon



6.1 Point Cloud Settings

Click **Point Cloud Settings** to open the **Point Cloud Settings** window in the right panel.



6.1.1 Point Cloud

The tools in **Point Cloud Settings** only act on the point cloud selected in the **Point Cloud** drop down list.

6.1.2 Point Size

Increase or decrease the point size.

6.1.3 Point Sizing

Adjust the manner in which point size is displayed in the **3D View**.

- **Adaptive:** when zooming in, the adaptive setting keeps the same relative size.

- **Attenuated:** point size will be small, regardless of **Point Size** property.
- **Fixed:** allows you to adjust the **Point Size**. Zooming in does not affect the relative size.

6.1.4 Point Shape

Choose between **Paraboloid**, **Circle**, and **Square**.

6.1.5 Opacity

Change the transparency of points.

6.1.6 Colour By Attribute

From the drop-down list, choose how the point cloud is coloured. Depending on which option is selected, relevant tools on further customising the colouring are offered below **Attribute** drop down.

- **Adjusted Colour:** use the real-life colouring of the point cloud (if available). Adjust **Gamma**, **Brightness**, and **Contrast** attributes as required to make the data more readable.
- **Elevation:** colour the points with reference to their **Elevation**.
- **Custom Colour:** set a specific colour.
- **Matcap:** choose a specific material colour.
- **Indices:** colours by the colour index, related logarithmically to intensity.
- **Level of Detail:** colour based on number of nearby points in the current **3D View**.
- **GPS Time:** colour based on GPS time. The point cloud file must have this information in order to be used.
- **Classification:** Colour the point cloud based on classification data (if available).

6.2 Load Point File

Press the **Load Point File** to open the file selection dialog.

Choose a file from your PC to import in **Cloud Processing**. When a file is selected, a window appears displaying the loading progress. Cancel the import if required.

Note that loading large point clouds can take several minutes to process, please be patient.

Currently supported point cloud file types are:

- **LAS:** LAS file (*.las)
- **LAZ:** LAZ file (*.laz)
- **TXT:** Point cloud text file (*.txt)
- **XYZ:** Point cloud text file (*.xyz)
- **DXF:** DXF file (*.dxf)
- **CRD:** Carlson coordinate file (*.crd)
- **CRDB:** Carlson coordinate database file (*.crdb)

6.3 Quarryman Wizard ☰

Use the **Quarryman Wizard** to import FSC files from the **Quarryman**.

On the left of the **Quarryman Wizard** are displayed all the steps it is necessary to progress through to import, process and output data in a FSC file. On completion of each step, click **Next**. Alternatively, click **Previous** to return to the previous step.

6.3.1 Notes on processing Quarryman data

Quarryman Studio is designed to be as flexible as possible to allow various coding systems and field workflows.

However, for the most efficient processing, note the following points below for coding Quarryman data in the field.

- Your Station ID, as entered in the Quarryman, should be the ID of your station in **Quarryman Studio**.
IE if you identify your Station ID as 02 in the Quarryman, your Station ID in **Quarryman Studio** is also 02.
- When using the Quarryman in the field, code any individual shots to a target according to the ID of that target. This includes:
 - Resection targets
 - GNSS-observed reference points
 - Other existing instrument stations
 - New, previously unoccupied, instrument stations.
- Any **Ground Control Points** (GCPs) created or imported into **Quarryman Studio** should be named using the same ID as the code used in the Quarryman when shooting to the GCP (see section 6.3.2).
- Resection observations should be separated out with each observation given a separate code according to the ID of the station being observed. For example, if you are resecting to GCPs 91, 95 and 97 then take three separately-coded shots to these stations using code IDs 91, 95 and 97. The code used in the field should match the GCP ID in **Quarryman Studio**.
- Some software packages rely on referencing / zeroing the Quarryman's horizontal encoder when it is first powered up, with no requirement to actually take an observation. In **Quarryman Studio**, when back-sighting or referencing to a known GCP or station, always take the observation and identify it with the correct code ID.
- The IDs of all GCPs / stations should be reserved in the **Loading Template** with the **Feature Type** specified as **Target** (see section 6.3.3).
- At the **Alignment** stage, if all guidelines above are followed, and IDs are correctly used in the field and in the **Quarryman Wizard**, leave the drop down list against each station set to **Calculate Direction!** (see section 6.3.4).

Note that once the Quarryman FSC file has been loaded into the **Quarryman Wizard**, tools are available to edit the codes and station numbers retrospectively if mistakes have been made in the field.

6.3.2 Ground Control Points

Add **Ground Control Points** (GCPs) manually or import them from an ASC or CRD file. GCPs are used to position and align the FSC data in later steps.

FSC Wizard

1 Ground Control Points

2 Data Import

3 Alignment

4 Render Point Cloud

5 Make Surface

6 Send to Blast Ops

Coordinate System

☒ XYZ
 ☐ NEZ

ID	X	Y	Z	Active	Delete
10	36392.67	49308.40	25.20	☒	Delete
20	36271.30	49346.33	3.77	☒	Delete
30	36339.23	49145.39	-17.27	☒	Delete
40	36234.86	49254.66	-40.64	☒	Delete
50	36352.07	49240.44	-55.49	☒	Delete
60	36244.79	49238.96	-51.39	☒	Delete
			-64.24	☒	Delete

+ Add New Point

Import CRD File

Import Ascii File

Export

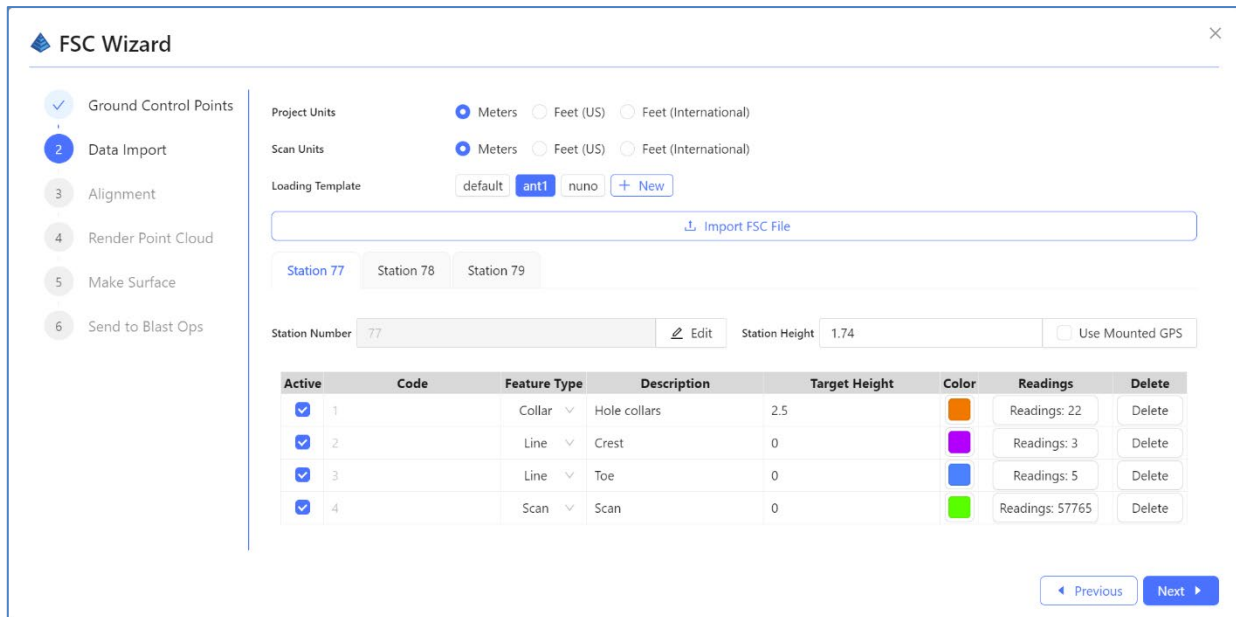
Previous

Next

Use the column of Active check boxes to ensure all GCPs used in the Quarryman processing are used in the project.

6.3.3 Data Import

Import and code data within the FSC file.



FSC Wizard

Ground Control Points

2 Data Import

Alignment

Render Point Cloud

Make Surface

Send to Blast Ops

Project Units: ☒ Meters ☐ Feet (US) ☐ Feet (International)

Scan Units: ☒ Meters ☐ Feet (US) ☐ Feet (International)

Loading Template: default **ant1** nuno + New

Import FSC File

Station 77 Station 78 Station 79

Station Number: 77 Edit Station Height: 1.74 ☐ Use Mounted GPS

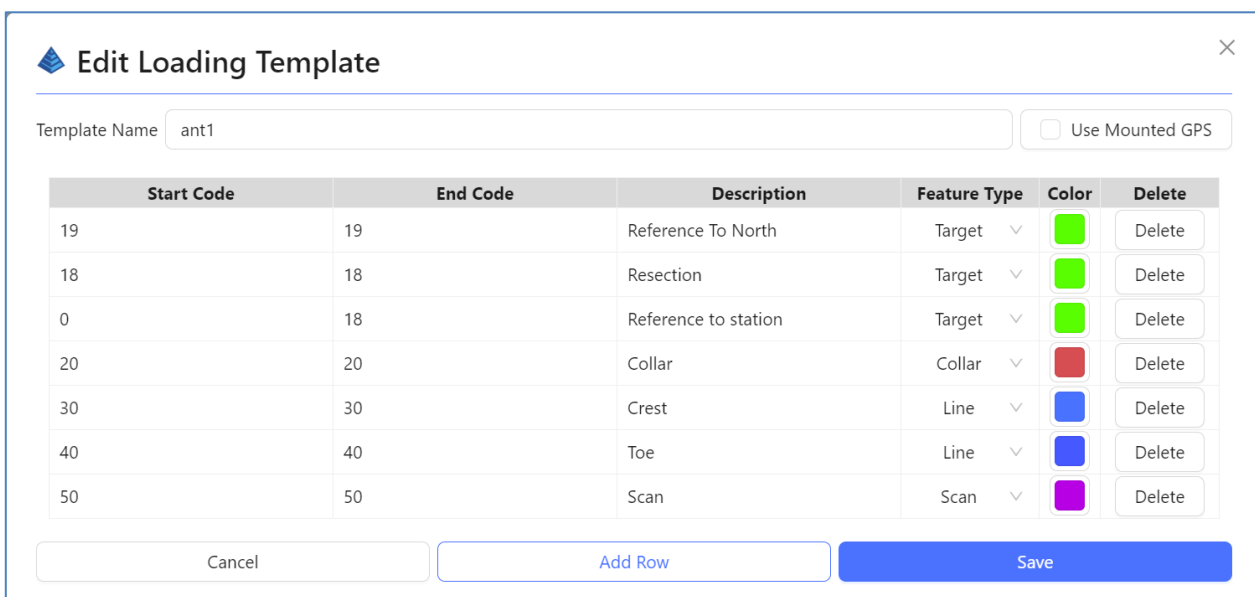
Active	Code	Feature Type	Description	Target Height	Color	Readings	Delete
☒	1	Collar	Hole collars	2.5	Orange	Readings: 22	Delete
☒	2	Line	Crest	0	Purple	Readings: 3	Delete
☒	3	Line	Toe	0	Blue	Readings: 5	Delete
☒	4	Scan	Scan	0	Green	Readings: 57765	Delete

Previous Next

- **Import FSC File:** Import an FSC file into the **Quarryman Wizard**.
- **Project units:** adjust the units used in the **Cloud Processing** project.
- **Scan units:** specify the units used by the Quarryman in the imported FSC file.
- **Loading template:** Select a preexisting template by clicking the template and selecting **Apply**.

A template specifies which datatype is referred to by each code in the FSC file. When an FSC is imported, the selected template is used to automatically group and identify the datatypes within the FSC file.

Add a new **Loading Template** by pressing the **New** button. The **Edit Loading Template** window appears.



Edit Loading Template

Template Name: ant1 ☐ Use Mounted GPS

Start Code	End Code	Description	Feature Type	Color	Delete
19	19	Reference To North	Target	Green	Delete
18	18	Resection	Target	Green	Delete
0	18	Reference to station	Target	Green	Delete
20	20	Collar	Collar	Red	Delete
30	30	Crest	Line	Blue	Delete
40	40	Toe	Line	Blue	Delete
50	50	Scan	Scan	Purple	Delete

Cancel Add Row Save

Manually associate scan code ranges with **Feature Types**, **Colours**, and **Descriptions**. It is recommended that you make a template the first time you import a .FSC file. If the same codes are always used in the Quarryman during field operations you can reuse the template for subsequent imports.

In order for data to be processed correctly, **Feature Types**, must be set as below:

- Observations to any named targets / stations / GCPs are set to **Target**.
- A sequence of shots to a crest or toe are set to **Line**.
- Shots to hole collars (or to a target above the collars) are set to **Collar**.
- Scans are set to **Scan**.
- **FSC data**: with a template selected and the FSC imported, the data found in the FSC is detailed at the bottom of the **Data Import** window.

Station 77
Station 78
Station 79

Station Number
77
Edit
Station Height
1.74
☐ Use Mounted GPS

Active	Code	Feature Type	Description	Target Height	Color	Readings	Delete
☒	1	Collar	hole collars	2.5		Readings: 22	Delete
☒	2	Line	crest	0		Readings: 3	Delete
☒	3	Line	toe	0		Readings: 5	Delete
☒	4	Scan	scan	0		Readings: 57765	Delete

The data is arranged by tabs representing the Stations that were identified in the FSC file.

Click on a station and all the coded data collected from that station is listed below.

As required, manually edit the **Feature Type**, **Description**, **Target height** and **Colour**.

Each coded dataset can also be toggled as **Active** or **Inactive**. Alternatively, click **Delete** to clear the dataset from the project.

6.3.4 Alignment

The **Alignment** step is used to position and align the point cloud data.

Note that in order for this step to be successful, the relevant GCPs must have been added (see section 6.3.2) and the imported FSC data must be correctly coded (see section 6.3.3). If these sections are not complete, or are configured incorrectly, the alignment will either not generate a solution, or it will generate data which is positioned or orientated incorrectly.

There are different options to support different Quarryman setups, including multiple stations.

- **Calculate Direction**: The most simple option, requiring at least two GCPs with known coordinates.
- **Backsight to Non-Targeted GCP or Target**: Requires the Quarryman station's position as well as the **Number** of the non-targeted backsight GCP.

- **Known Direction to GCP or Target:** Requires at least two GCPs with positions as well as the direction between them.
- **Known Direction of Startup:** Used when only the Quarryman station's position and startup cardinal direction are known.

For each occupied station, an alignment option must be selected and the associated fields configured.

Click **Carry Out Survnet Alignment** to align the data.

The results of the alignment appear on the right of the window. When the alignment is successful, a table and a plot of the adjusted station positions graph appears on the right of the window.

Station 1

✓ GCP 1 found. Position known

X 3000 Y 5000 Z 100

Quarryman Direction
Calculate Direction!

Number

Known Initial Direction

Station 2

✓ GCP 2 found. Position known

X 3023.68 Y 5046.57 Z 113.18

Quarryman Direction
Calculate Direction!

Number

Known Initial Direction

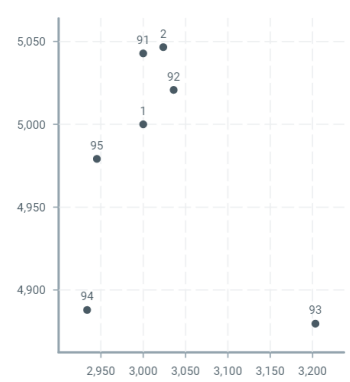
Carry Out Survnet Alignment

Alignment Results

✓ Alignment Successful!

Download Alignment Report

Code	X	Y	Z
1	3000.00	4999.99	100.00
2	3023.66	5046.56	113.17
91	2999.97	5042.79	110.95
92	3035.93	5020.73	111.06
94	2933.72	4887.93	96.69
95	2945.26	4979.12	111.38
93	3203.35	4879.65	114.83

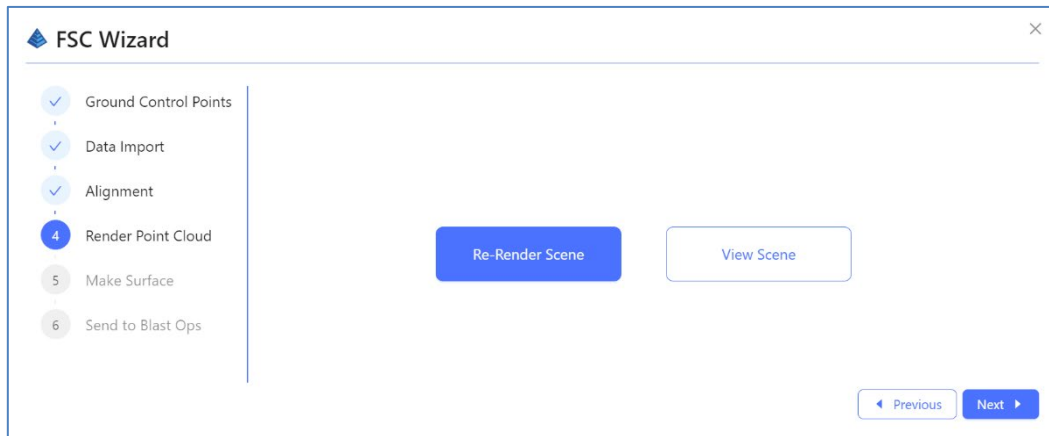


6.3.5 Render Point Cloud

With the Alignment complete, click **Next**. The point cloud is imported into the scene.

Use the **Re-Render Scene** button to refresh the point cloud if an error occurs or if you back track through the previous steps and need to update the scene.

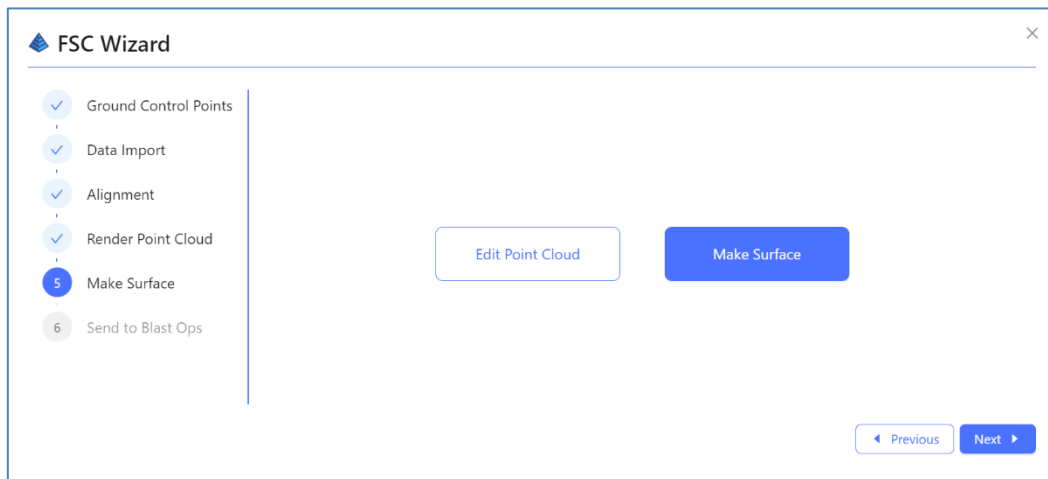
Click **View Scene** to minimize the window. The 3D View opens from where you can inspect the loaded point cloud.



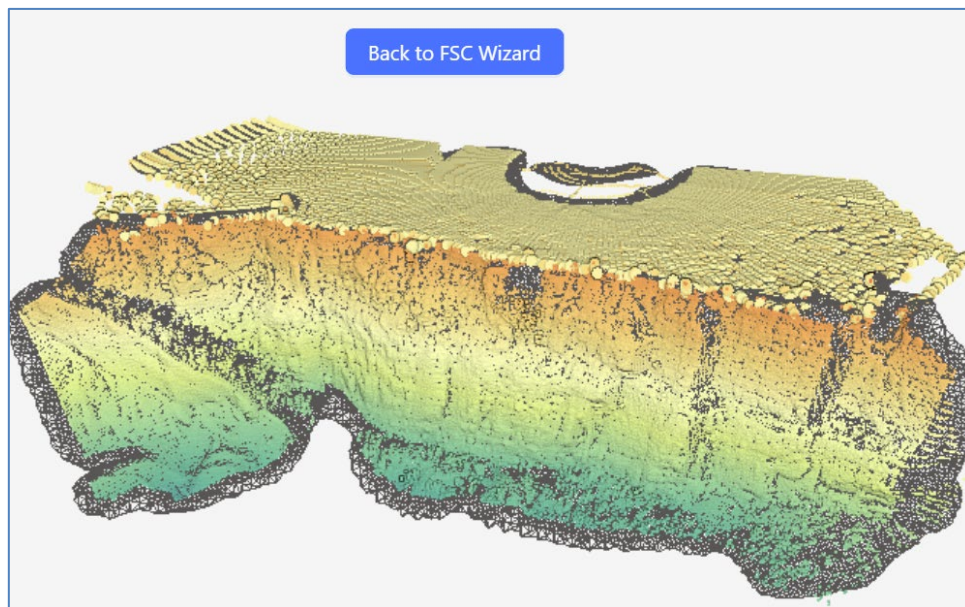
6.3.6 Make Surface

In the **Make Surface** step, click **Edit Point Cloud** to open the **3D View** with the **Point Clouds** tab active. Use the add patches and remove regions tools to edit the point cloud. These functions help to prepare the point cloud before a surface is created. These tools are covered in sections 6.4 and 6.5.

Click **Make Surface** to open the **3D View** with the **Surfacing** tab active. This tab offers tools to generate a surface from the edited point cloud. The surfacing tools are covered in section 8.



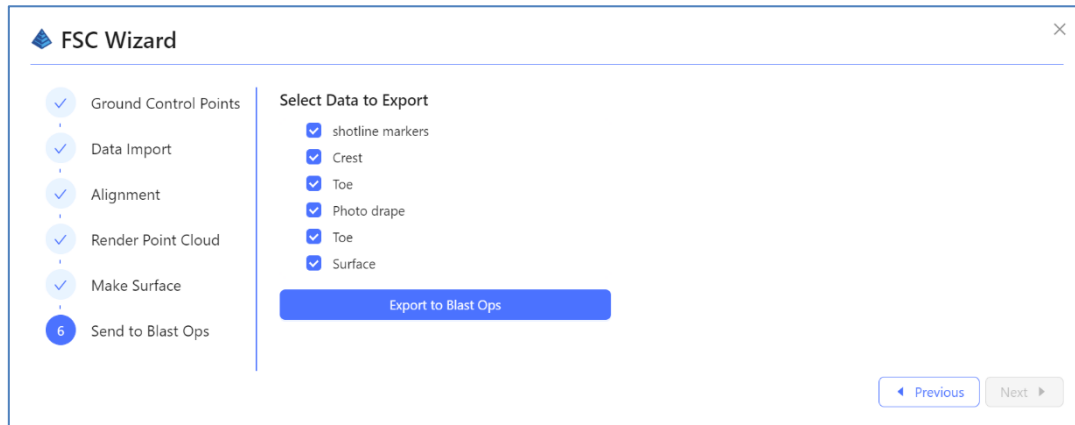
While the **3D View** is displayed for editing points or creating a surface, click **Back to Quarryman Wizard** to return to the **Quarryman Wizard** window.



6.3.7 Send to Blast Design

With the surface created, the **Send to Blast Design** step lists the items in the dataset that can be exported to **Blast Design**.

Tick the appropriate check boxes and click **Export to Blast Design** to open this project in **Blast Design**.



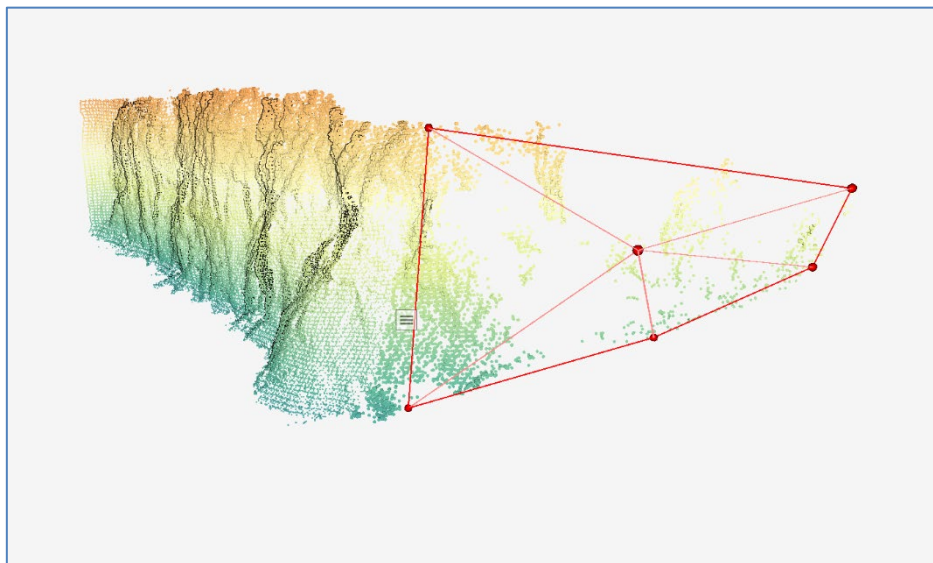
6.4 Patch Tool

If there are holes in the point cloud, these can be sealed over with the **Patch Tool**  before the surface is created. New points are created and used for the surface generation.

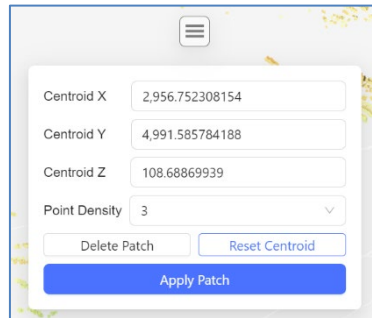
Exercise caution when using this tool. The **Patch** tool is usually used for appending data to the top of the bench to create a coherent surface where a pattern might be added. The **Patch tool** creates interpolated data and cannot determine if, for example, problematic areas of the face are being ignored. If there are large areas where data is missing it might be necessary to carry out a fill-in survey in the field.

Click the **Patch Tool**.

Left-click the extent of the area to fill. Right-click to finish defining the area.

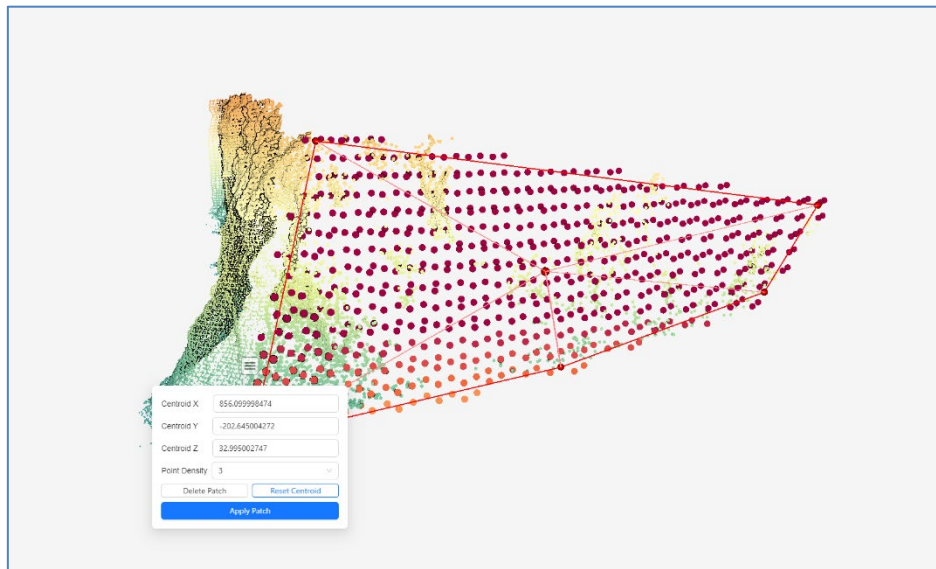


A menu button  appears in the **3D View**. Click the button to open the patch settings.



Centroid X: 2,956.752308154
 Centroid Y: 4,991.585784188
 Centroid Z: 108.68869939
 Point Density: 3
 Delete Patch Reset Centroid
 Apply Patch

Select **Apply Patch** to generate the additional points.



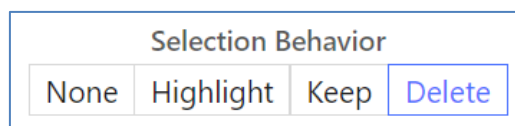
When a patch is created, the patch appears in the **Scene Explorer** under **Measurements**. From here the patch can be toggled ON and OFF in the **3D View** or deleted from the project.

6.5 Selection Tools

When creating a surface from a point cloud, aim to first reduce the point cloud so that it only covers the main areas of interest. Use the **Selection tool** to select sections of the point cloud to delete or retain.

Both the **Polygon Selection**  and **Box Selection**  tools can be used to define the extent of the selected point cloud area.

Use the **Selection Behaviour** tool to toggle the action that is applied to selected points.

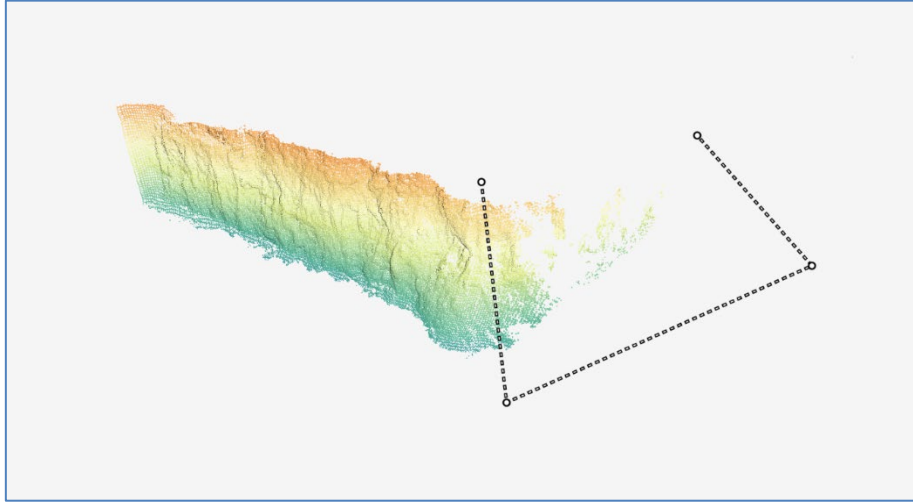


Selection Behavior
 None Highlight Keep Delete

- **Delete:** automatically delete selected points.
- **Keep:** retain selected points and delete all unselected points.

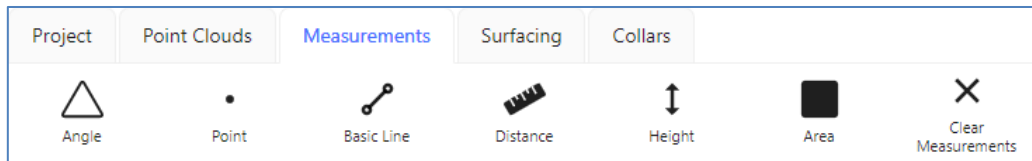
- **Highlight:** highlight selected points onscreen.

When using the **Polygon Selection**, use the left mouse button to draw out a polygon. Use the right mouse button to complete the selection.



When a polygon is created, the polygon appears in the **Scene Explorer** under **Clippings**. From here the polygon can be toggled ON and OFF in the **3D View** or deleted from the project.

7 Measurements ribbon

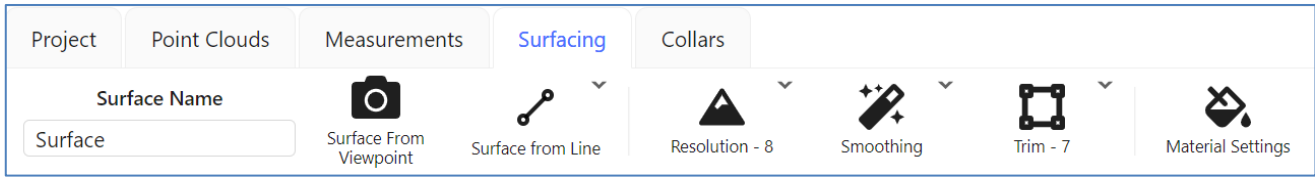


The **Measurements** tab contains a number of different tools for further analysis of a point cloud. This includes tools for adding different measurements and annotations to the point cloud.

Each measurement is added to the **Measurements** container in the **Scene Explorer**.

Use the **Clear Measurements** button to delete all of the current measurements in the scene.

8 Surfacing ribbon



The **Surfacing** ribbon contains all of the tools associated with generating a surface from the current point cloud data.

8.1 Surface Name

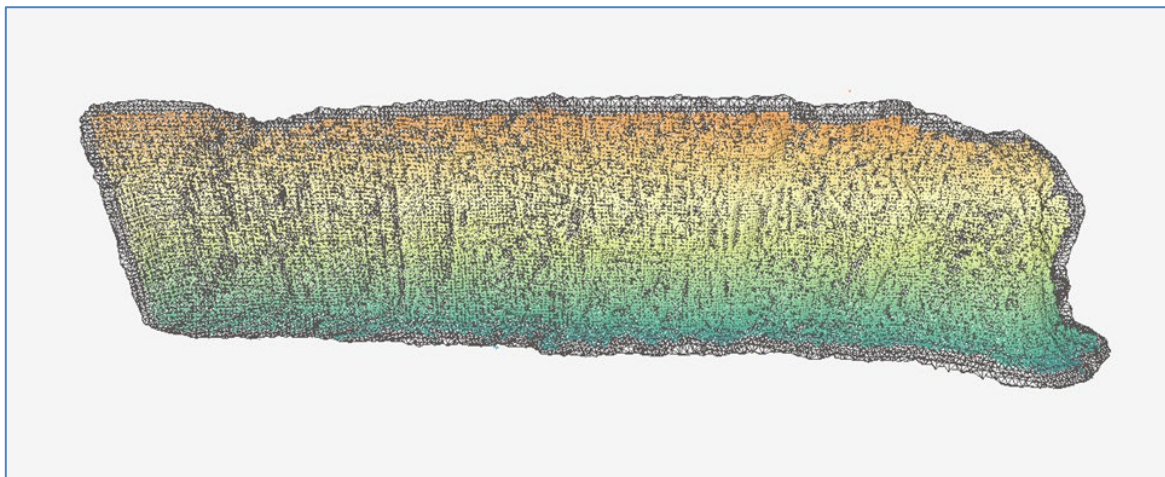
Before creating a surface, enter a name for the surface.

8.2 Surface From Viewpoint

Use **Surface From Viewpoint** to create a surface from the perspective of the view in the **3D View**.

The surface is generated with reference to the edited point cloud. The configured **Resolution**, **Smoothing** and **Trim** settings are applied.

Note: the quality of the generated surface is completely dependent on the viewpoint that has been adopted onscreen. If there is point cloud data for the top bench and bottom bench, the recommended viewpoint is looking from within the quarry bench out, at an upwards angle,



8.3 Surface from Line

Creates a surface from a line that has been created in **Measurements > Basic Line**. This tool is required to make tunnel surfaces. Draw a line through the tunnel and the surface will be created by calculating normals to the line.

The line height field is an offset for the line on the z axis. If the line is drawn along the bottom of the tunnel, set the line height to roughly half the height of the tunnel. This will ensure the surface normals point towards the inside of the tunnel.

8.4 Resolution

Adjust the **Resolution** slider to adjust the number of points used for surface creation. In turn, this adjusts the size of the triangles themselves, which affects the size of the exported surface.

8.5 Smoothing

Toggle **Smoothing** ON and OFF to create a cleaner surface.

- **Drop Sparse Points:** toggle to keep or drop isolated points.
- **Smoothing Search Radius:** controls the distance at which to determine the nearest points to use for the smoothing filter.
- **Surface Complexity:** adjust the complexity of the surface. As the value is decreased, the generated surface becomes smoother.

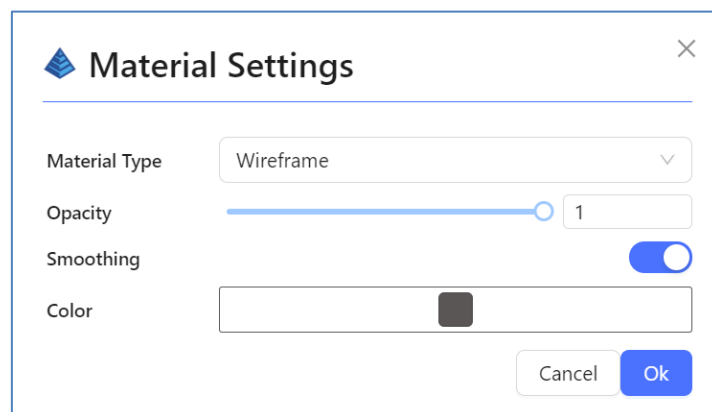
8.6 Trim

Use **Trim** to dynamically adjust how far beyond each grouping of points the surfacing extends. Increase the **Trim** to reduce the 'padding' which is extrapolated beyond the point cloud.

Lowering the **Trim** value too much can produce a surface that lies outside the desired geometry and conversely a higher value can produce gaps within the rendered surface.

8.7 Material Settings

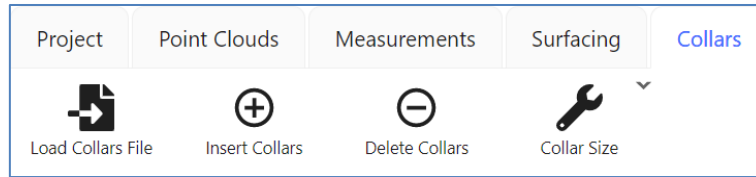
The **Material Settings** tool allows attributes and properties of the surface to be defined.



- **Material type:** change the nature of the surface.
- **Opacity:** change the translucency of the surface.
- **Smoothing:** toggle surface smoothing ON and OFF.
- **Colour:** change the colour of the surface.

The same tools can be accessed by right-clicking on the surface on the **Scene Explorer**.

9 Collars ribbon



The **Collars** ribbon allows the user to locate hole collars after a surface has been created.

This tool is primarily used in conjunction with drone point cloud data, as the colourisation of the point cloud would allow for easy location of the hole collar locations.

Collars created in **Point Processing** can be exported to **Blast Design** with the surface. In **Blast Design** select **Holes > Import Holes > Collars** to convert them into holes (see section 17.1.4).

9.1.1 Load Collars File

Click **Load Collars File** to import collar files into the **Cloud Processing** project. Formats supported include: TXT, CSV, DXF and CRD.

9.1.2 Insert Collars

Use the **Insert collars** tool to manually insert holes with a mouse-click on the surface.

9.1.3 Delete Collars

Use the **Delete Collars** tool to manually delete collars created on the surface.

9.1.4 Collar Size

The **Collar Size** tool allows adjustment of the size of the collar in the **3D View**.

Blast Design

10 Blast Design introduction

Blast Design is an integrated blast design and planning module developed to support the full drill and blast workflow from setting out design holes through to final reporting. It provides engineers and blasting professionals with a comprehensive set of tools to design, analyse, and document blasting operations with accuracy, consistency, and efficiency.

Surfacing tools allow users to import surface models from a range of sources, including Cloud Processing-generated surfaces, photogrammetry, and third-party design packages. These surfaces form the basis for accurate volume calculations, enabling users to quantify in-situ material, design blast boundaries, and assess expected outcomes prior to drilling and charging.

Blast Pattern Layout functionality allows users to define burden, spacing, hole orientation, and pattern geometry. Drill hole data can be reviewed and edited in detail, supporting both planned and as-drilled geometries to ensure the design reflects actual field conditions.

Within the **Drill Hole Loading** feature, users can create reusable loading templates that define explosives, stemming, initiators, and boosters. These templates can be applied across the blast pattern to ensure consistent charging practices while automatically calculating explosive quantities and powder factors.

The **Timing and initiation** section provides tools for users to assign delays, model firing sequences, and validate initiation logic for both non-electric and electronic systems. This ensures safe, controlled blast progression and supports optimisation of fragmentation, vibration, and throw.

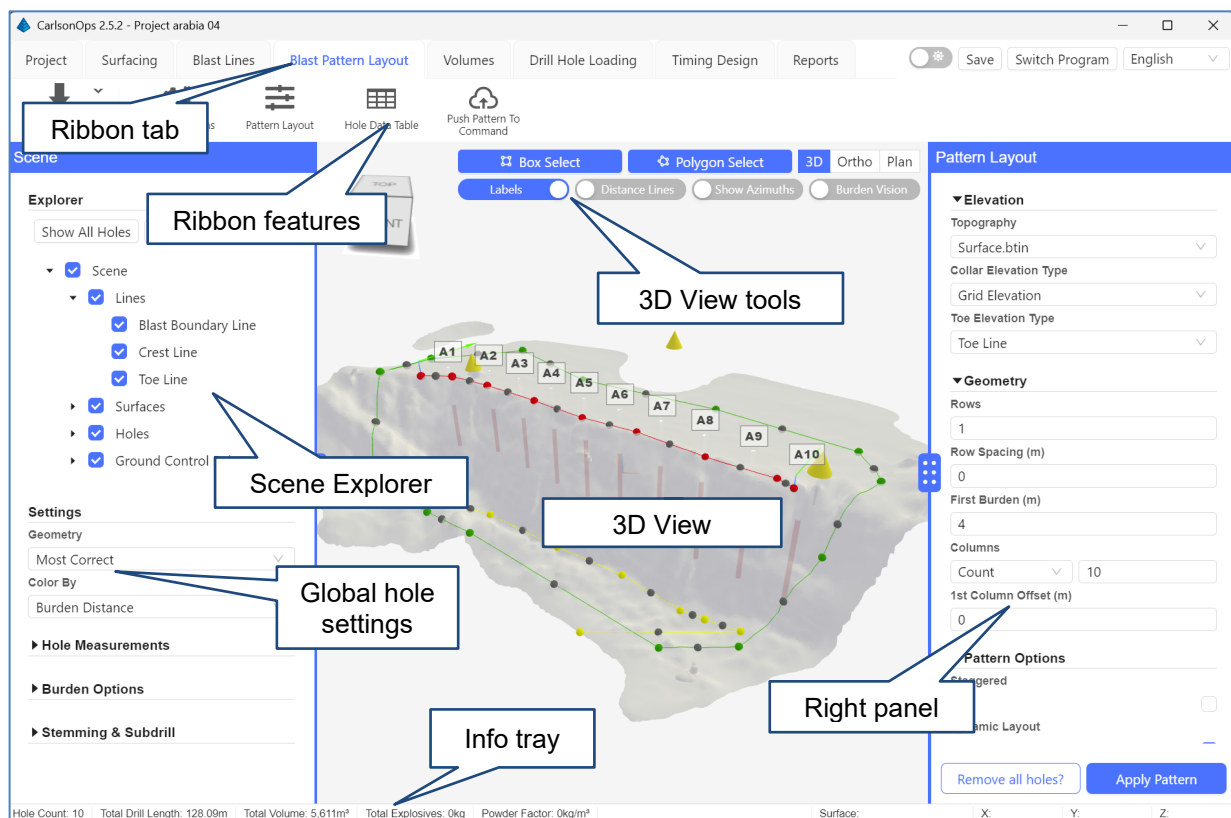
Reporting: generate detailed blast reports, drill and load sheets, quantity summaries, and compliance documentation, supporting clear communication with operations, contractors, and regulatory requirements.

11 Screen Layout

On creation of a new **Blast Design** project, the main window appears.

A standard screen layout is composed of the elements outlined below.

- **Ribbon Tabs:** the main functions for blast design workflow.
- **Ribbon Features:** the buttons and other controls under the selected ribbon tab.
- **2D/3D View:** the main part of the screen where active data is displayed.
- **Scene Explorer:** collapsible panel on the left side of the **3D View** showing all elements in a project.
- **Global Hole Settings:** beneath the **Scene Explorer**, settings which apply to all holes in a project.
- **Right Panel:** collapsible panel on the right side of the **3D View** showing context-dependent functionality.
- **3D/2D Viewer tools:** various selection and view tools for 3D/2D viewer.
- **Info tray:** live information about the project and on-screen data.



11.1.1 Ribbon tabs

Ribbon tabs are used to organize **Blast Design** by feature/use case. The tabs are positioned left to right in an order that matches the normal processing sequence of a **Blast Design** project.

On the far right side of the **Ribbon tabs** are controls that are shared between both **Cloud Processing** and **Blast Design**.

- **Theme:** toggle between light and dark mode.
- **Save:** save the project's current state.
- **Exit:** open the **BlastOPS Home** screen to select **Cloud Processing** or **Blast Design**.
- **Language:** change which language the program uses.

11.1.2 Ribbon features

Ribbon Features are the buttons and other controls under a given ribbon.

Each ribbon and its associated features will be covered in depth throughout this manual.

11.1.3 3D View

The **3D View** is the core of **Cloud Processing** and **Blast Design**. It is always located in the centre of the screen. This is where all 3D data is displayed.

To facilitate precise viewing of the data in the **3D View**, use the following controls:

- **Zoom in/out:** roll the scroll wheel when on a mouse.
- **Rotate:** click and drag with the left button on a mouse.
- **Pan:** click and drag with the right button on a mouse.

11.1.4 3D View tools

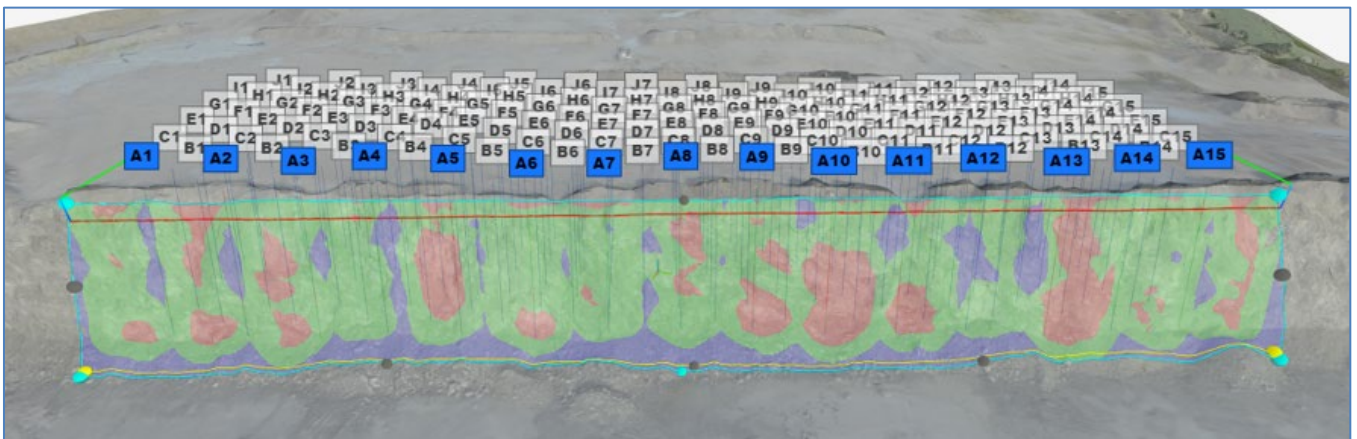
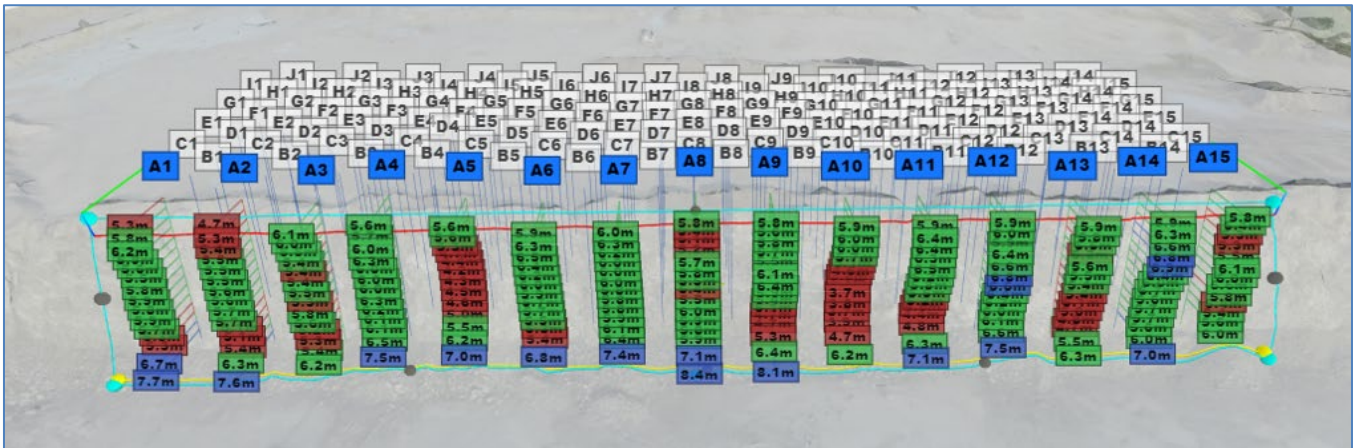
3D View tools are always present in the **Blast Design** module. These tools affect what is seen in the **3D View** and how the view behaves.

- **Orientation box:** rotate the box to rotate the data. Click on a labelled side of the box to orientate the data to a fixed viewpoint matching the label.
- **Box Select:** draw a rectangle with the mouse to select a hole or group of holes in the **3D View**. The selected holes are represented in the **Hole Tools**.
- **Polygon select:** draw a polygon with the mouse to select a hole or group of holes in the **3D View**. The selected holes are represented in the **Hole Tools**.
- **3D:** set the **3D View** to perspective view.
- **Ortho:** set the **3D View** to orthogonal view.
- **Plan:** lock the **3D View** to a plan view. In this mode, the data only rotates around the Z axis.
- **Labels:** turn on hole labels and measurement labels.
- **Distance Lines:** turn on lines showing the burden from the holes to the face.
- **Show Azimuths:** turn on arrows showing the direction from each collar to nearest point on the crest.
- **Burden Vision:** turn on **Burden Vision** in the **3D View**. Burden Vision requires a **Crest Line** and a **Toe Line** to have been drawn. These lines form the boundary of the **Burden Vision** surface.

The **Burden Vision** surface marks out the limits of the search area for burdens from holes. Any burdens that hit outside of its area will be ignored.

When **Burden Vision** is toggled on, any part of the surface within the bounds of the **Burden Inclusion**

Line will be coloured based on the distance to the closest hole.



11.1.5 Scene Explorer

The **Scene Explorer** occupies the left panel. The **Scene Explorer** acts as a 'project tree' showing all data in the active project.

Tools in the **Scene Explorer** allow you to navigate the 3D data currently loaded in the **3D View**.

Tick or untick the check boxes beside each entity to make it visible or invisible in the **3D View**.

Right-click on items in the list to open context menus with actions specific to the item clicked.

11.1.6 Global hole settings

Beneath the **Scene Explorer** are arranged settings which affect all holes in the **BlastOPS** project. Further information on these settings are outlined in section 12.

Settings specific to each individual hole are displayed in the **Hole Tools** tab when a hole or group of holes is selected. Further information in section 13.

11.1.7 Right panel

The **Right panel** shows tools related to the currently selected ribbon feature or on-screen element.

The **Hole Tools** appears in the right panel whenever a hole or group of holes are selected in the 3D View. The **Hole Tools** provides tools to adjust hole parameters for the selected holes.

Both of the side panels can be opened and closed using the blue handle on the associated side. More information about specific panels can be found below.

11.1.8 Info Tray

The Info tray appears in the **BlastOPS** status bar and displays live information on the current project and the data currently underneath the mouse pointer. Information includes:

- **Hole count:** total number of holes in the current project.
- **Total drill length:** total length of all holes.
- **Total volume:** the total volume encompassed by the project area (see section 18.2).
- **Total explosives:** the amount of explosives that have been planned using the **Drill Hole Loading** features (see section 19).
- **Powder factor:** the amount of explosives per cube metre designed into the current project.
- **Surface:** the surface under the mouse pointer.
- **X,Y,Z:** coordinates of the location under the mouse pointer.

12 Global Hole Settings

The **Global Hole Settings** are always present in the **Scene Explorer** panel. These controls can be configured to adjust parameters of all holes in the current project.

Tools to configure individual holes are available in the **Hole Tools** (see section 13).

Settings

Geometry

Most Correct

Color By

Burden Distance

▼ Hole Measurements

Distance Between

None

Target Spacing (m)

4

Associate By

Hole Count

4

Max Distance (m)

30

✓

▼ Burden Options

Burden (m)

5

Tolerance (%)

10

Measurement Interval (m)

1

Surface

Surface.btin

Method

Perpendicular Straight

▼ Stemming & Subdrill

Stemming (m)

2

Subdrill (m)

0

12.1 Settings

12.1.1 Geometry

Use the **Geometry** drop down list to select the holes that are displayed and used in the current project. Select from:

- **Most correct:** display the holes closest in status to 'as-built', in the order: **Boretrak** > **Surveyed** > **Design**.
- **All:** show all hole geometries.
- **Design:** show the holes attached to design collars.
- **Surveyed:** show the holes attached to surveyed collars.
- **Boretrak:** show the Boretraked holes.

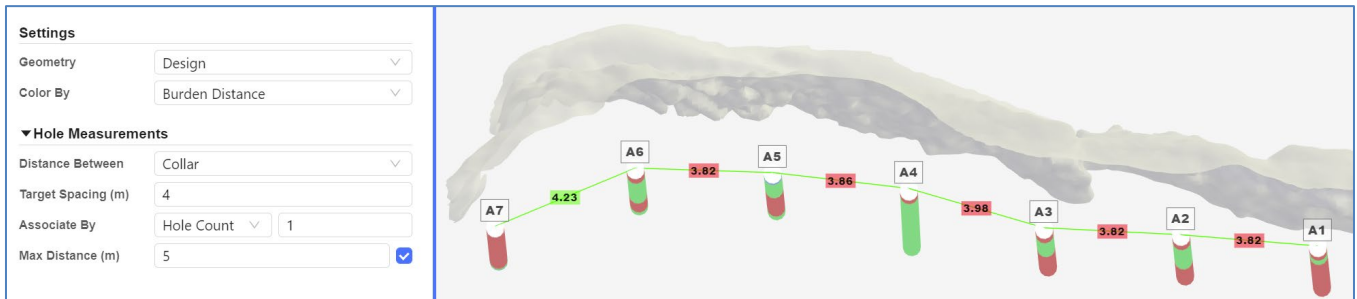
12.1.2 Colour By

Display the holes coloured according to:

- **Burden distance:** colour according to the burden measured from each section of hole. This takes into account the **Burden Options** which have been selected (see section 12.3).
- **Hole type:** colour by the type of hole, as selected in the **Hole Geometry** drop down list.
- **Hole loading:** colour according to the way in which the hole has been loaded in the **Drill Hole Loading** module (see section 19).

12.2 Hole Measurements

Display measurements between holes in the **3D View**. The following settings enable configuration of the way these measurements are visualised.



12.2.1 Distance Between

Select to show:

- **Collar:** measurements between the hole collars.
- **Toe:** measurements between the hole toes.
- **None:** no measurements are shown.

12.2.2 Target Spacing (m)

Enter the minimum acceptable spacing between holes. Any distances less than the entered **Target Spacing** is shown in red. Distances above this threshold are shown in green.

12.2.3 Associate By

Hole Measurements are calculated to neighbouring holes. Use the **Associate By** drop-down list to determine how many of the closest holes are counted as neighbours.

- **Hole count:** set the number of holes that are considered as neighbours to a given hole.
- **Distance:** set the distance within which holes are considered neighbours to a given hole.

12.2.4 Max Distance

Set the distance, beyond which, holes will not be considered neighbours.

12.3 Burden Options

Set the parameters that are used for calculating the burdens for reports and visualisation in the **3D View**.

12.3.1 Burden (m)

Set the target burden distance for the active project.

12.3.2 Tolerance (%)

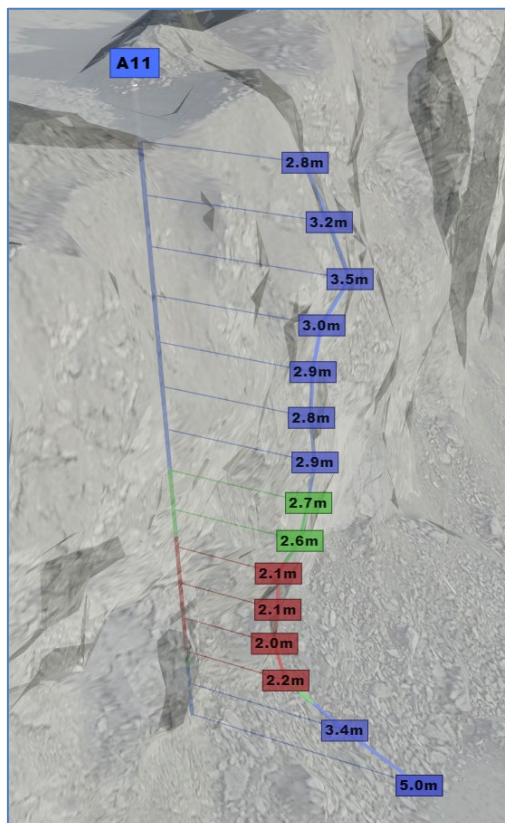
Set the percentage tolerance accepted for the **Burden**.

For example, if **Burden** is set to 4m, and **Tolerance** is set to 10%, burdens measured from 3.6m to 4.4m are accepted as within tolerance.

12.3.3 Measurement Interval (m)

Set the interval in which the burden measurements are made along the length of the hole.

The frequency of measurements is reflected in the reports and in the on-screen measurements and colouring in the **3D View**.



12.3.4 Surface

Use the **Surface** drop down list to select the surface to be used for burden calculations.

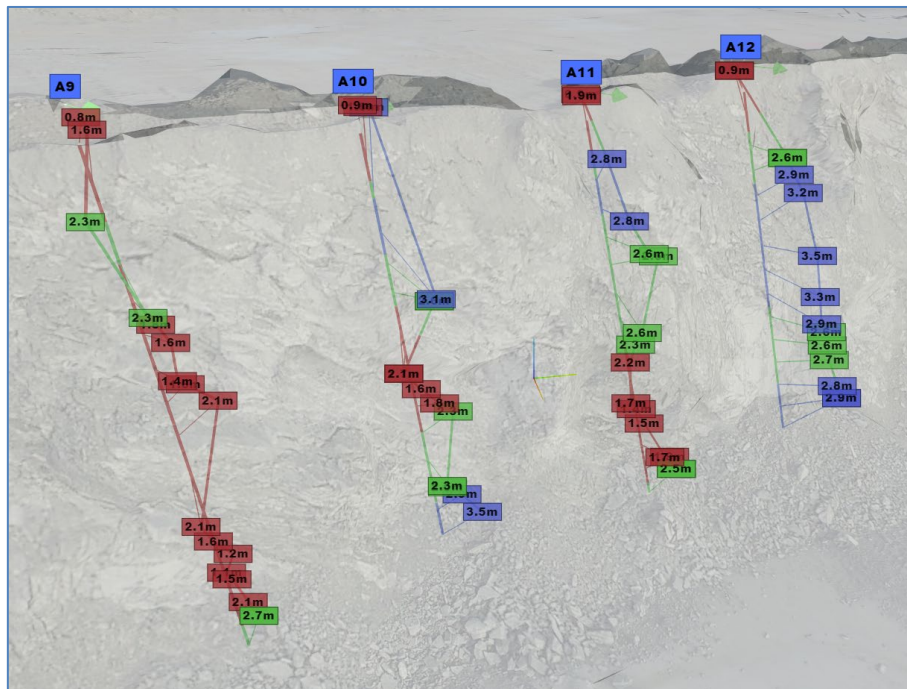
12.3.5 Method

Select the method that is used to find the weakest burden from each **Measurement interval** down the hole.

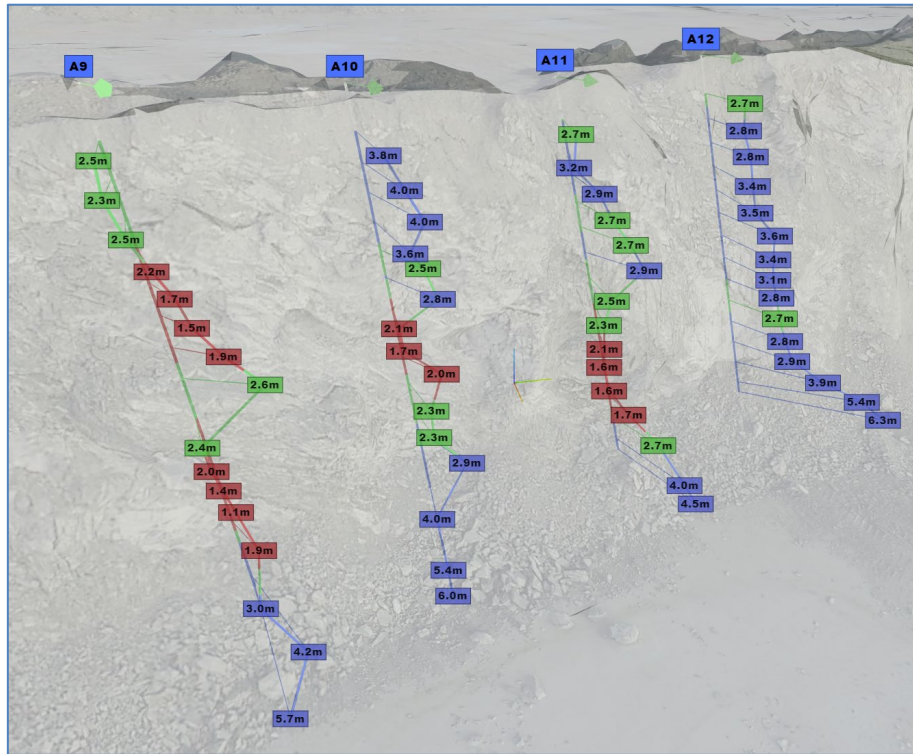
Take care to select the most appropriate method for your project and methodology. Selecting the wrong method may lead to weak burdens being overlooked.

Note that burdens are only calculated for areas on the surface which are encompassed by the **Crest Line** and the **Toe Line** (see sections 16.1 and 16.3). These lines delineate the **Burden Vision** surface which offers another way of displaying the burdens graphically (see section 11.1.4).

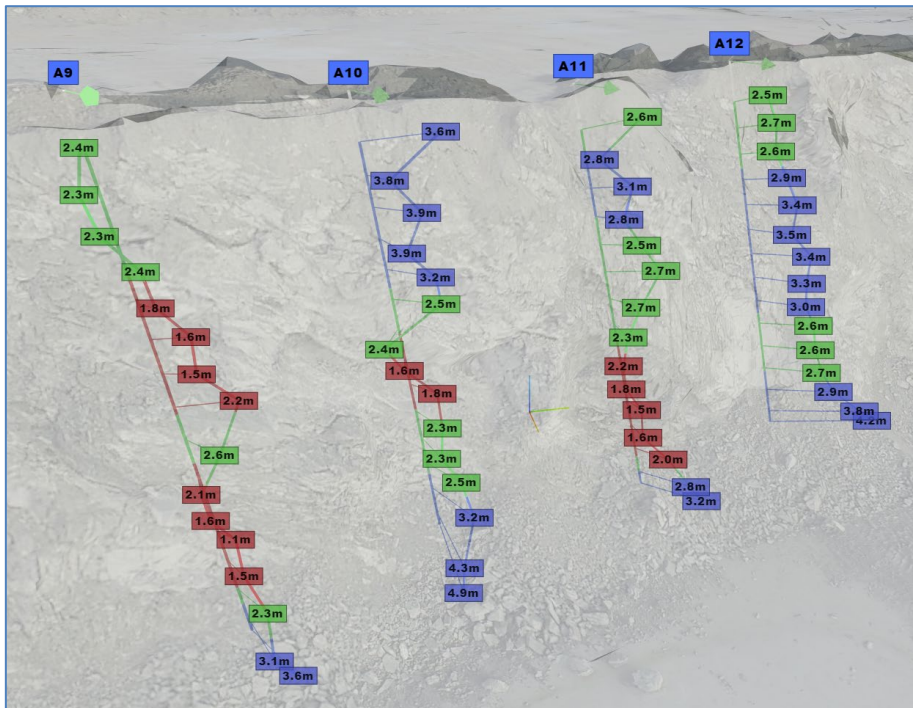
- **3D minimum:** unconstrained search in all directions across the face.



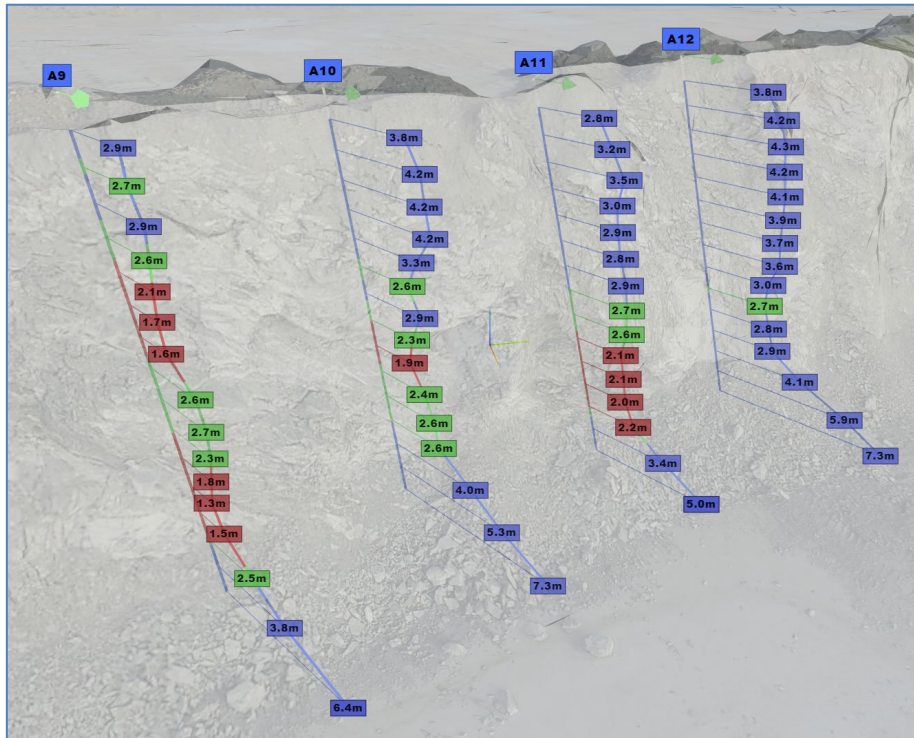
- **Horizontal planar:** search in all directions across a plane projected horizontally from the measurement interval.



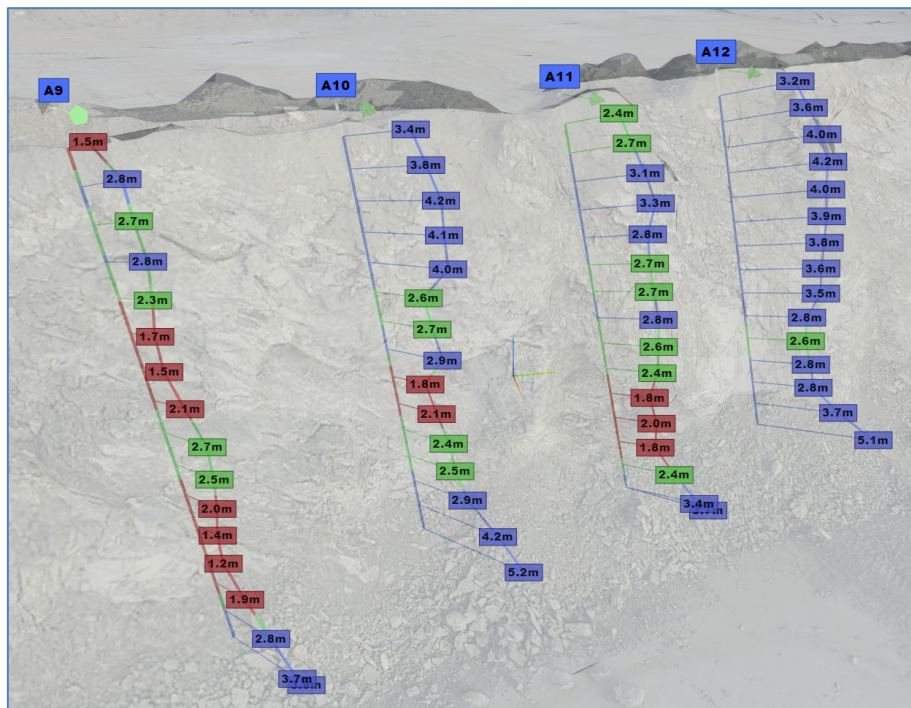
- **Perpendicular planar:** search in all directions across a plane projected perpendicularly from the measurement interval.



- **Horizontal straight:** search horizontally out from the measurement interval in the direction of the hole azimuth.



- **Perpendicular straight:** search perpendicularly out from the measurement interval in the direction of the hole azimuth.



12.4 Stemming & Subdrill

12.4.1 Stemming (m)

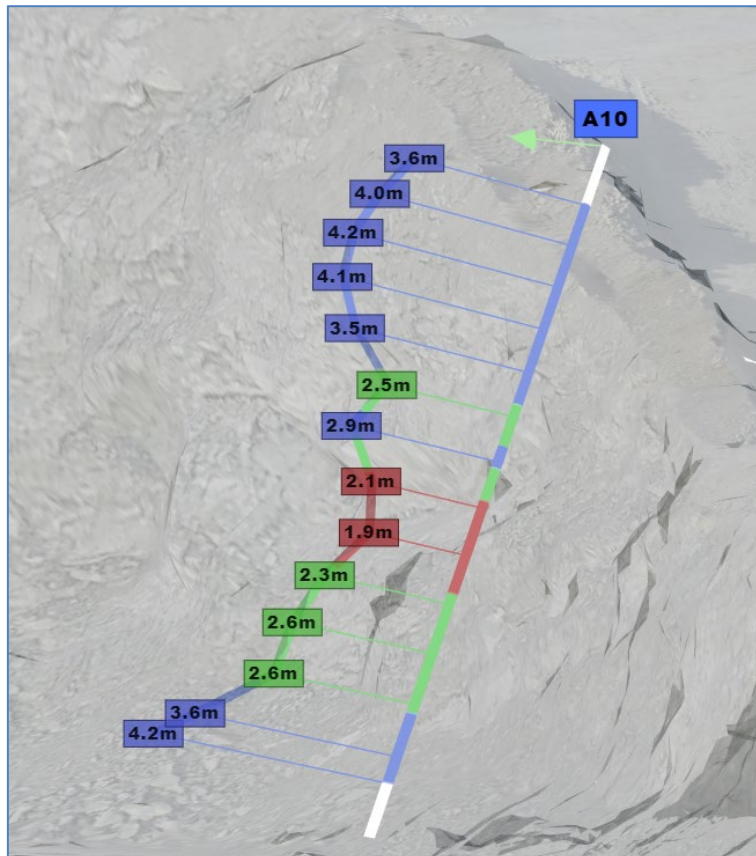
Set the default amount of stemming per hole. The stemming is positioned at the top of the hole above the explosive column.

In the **3D View**, the **Stemming** is shown as white. Burdens are not computed for the section of the hole designated as stemming.

12.4.2 Subdrill (m)

Set the default amount of subdrill per hole. Subdrill is the length of the hole that is drilled below the intended floor level of the bench.

In the screenshot below, 1m of **Stemming** and **Subdrill** can be seen at either end of the hole.



13 Hole Tools

The **Hole Tools** appears in the right panel when a hole, or group of holes, is selected. Tools are available to view and adjust design parameters of the selected hole(s).

Some of the parameters are disabled depending on whether the hole is surveyed or Boretraked. For example the **Orientation** and **Inclination** cannot be adjusted if the hole has been Boretraked.

If multiple holes are selected, some parameters give an average value – for example, an average **Length** – or state **'Multiple'** – for example, multiple **Rows**.

The **Global Hole Settings** (see section 12) offers tools to adjust the visualisation and reporting parameters of all holes in the current project.

Hole Tools

▼ Preview

☒ Side
 ☐ Front
 ☐ Top

A10 (Boretrak)

Centered At (3039.6, 5019.2, 111.8)

Accept Suggested Design

Max Suggested Inclination

General

Label

← →

Geometry

Row

Column

Diameter (mm)

Collar

Position (m)

3039
 5019
 111.8

Offset (m)

0
 0

Move Step (m)

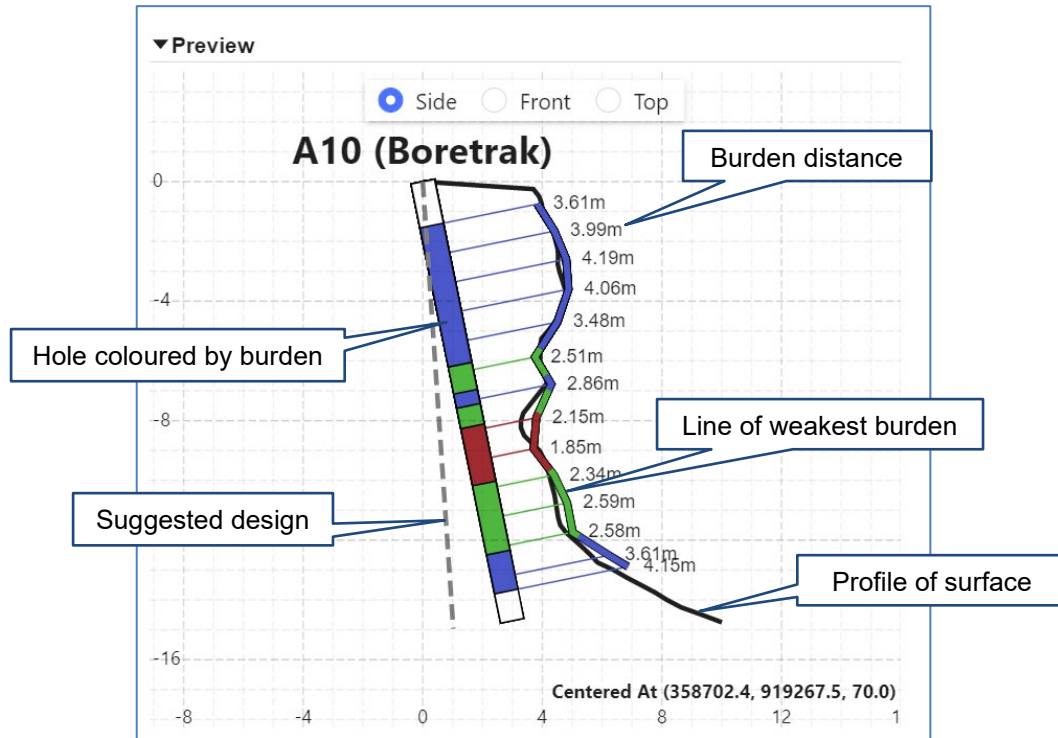
0.5
 0.5

BlastOPS user manual – v.1.02

Page | 46

13.1 Preview

13.1.1 Profile



The **Profile** section shows a view of the specified hole. The **Profile** is titled according to the hole ID and the **Geometry** displayed. For example in the screenshot above, the hole is labelled as **A10 (Boretrak)**.

Select the **Side**, **Front** or **Top** view radio buttons to change the view. If multiple holes are selected, only the **Top** view can be viewed.

With the **Side** view selected, the profile of the face directly line with the hole's design azimuth is shown as a black line. The line of weakest burden is also displayed, coloured by the calculated burden. The line of weakest burden is determined by the calculation method selected in **Burden Options** (see section 12.3.5).

Burden distances are shown at the selected **Measurement Interval** (see section 12.3.3).

13.1.2 Accept Suggested Design

Blast Design calculates the optimum hole design that would meet the target burden entered in the **Global Hole Settings** (see section 12.3). The degrees of freedom used in calculating the suggested design depend on whether the hole is **Design**, **Surveyed**, or **Boretraked**. If the hole is Boretraked, this feature is disabled.

The **Suggested Design** is shown in the **Profile** as a grey dashed line.

Note that the **Suggested Design** feature automatically calculates and adjusts the selected holes to the optimum position and orientation values according to parameters that you have entered into the software. However, you must manually check that each hole is designed according to your project and site specifications and regulations.

13.1.3 Max Suggested Inclination (°)

Enter a **Max Suggested Inclination** value to constrain the **Suggested Design** function. **Blast Design** will not automatically design holes at a greater inclination than the value entered here.

13.2 General

General	
Label	← C5 →
Geometry	Design
Row	2
Column	4

13.2.1 Label

Click the arrow buttons to scroll through the holes in the project.

Edit the **Label** in the text box to change the hole ID.

13.2.2 Geometry

Displays the **Geometry** of the selected hole.

13.2.3 Row

Displays the **Row** to which the selected hole is assigned. This value can be edited as required.

13.2.4 Column

Displays the **Column** to which the selected hole is assigned. This value can be edited as required.

13.3 Collar

Collar	
Position (m)	X 358712 Y 919230 Z 70.44 ✎
Offset (m)	Para. 0 Perp. 0 ↺
Move Step (m)	Para. 1 Perp. 1

13.3.1 Position (m)

Displays the **X,Y,Z** coordinates of the hole. These values can be edited if the hole is not surveyed.

Click the **Pick in Scene** to reposition the hole with a mouse click on the active surface.

13.3.2 Offset (m)

Displays the distance that the hole is offset from its original location in the pattern layout or imported design.

The offset directions relate to the hole azimuth.

The two text boxes show the separate offsets parallel to the hole azimuth (**Para**), and perpendicular to it (**Perp**).

Click **Reset Offset** to return both values to 0.0.

13.3.3 Move Step (m)

With a hole or group of holes selected in the **3D View**, use the arrow keys on your keyboard to manually shift the hole collar. The **Move Step** value establishes the distance that the hole collar is moved with each press of the arrow keys.

Up and **Down** keys move the hole collar parallel to the hole azimuth.

Left and **Right** keys move the hole collar perpendicular to the hole azimuth.

13.4 Orientation

13.4.1 Azimuth (°)

Displays the **Azimuth** of the selected hole. If the hole has not been Boretraked, this value can be edited.

13.4.2 Inclination (°)

Displays the **Inclination** of the selected hole. If the hole has not been Boretraked, this value can be edited.

13.5 Dimensions

13.5.1 Bottom elevation (m)

The Z coordinate of the bottom of the hole.

13.5.2 Diameter (mm)

The diameter of the hole. This is represented on screen in the **3D View** and also is accounted for in the **Hole Loading** functions (see section 19).

13.5.3 Depth (m)

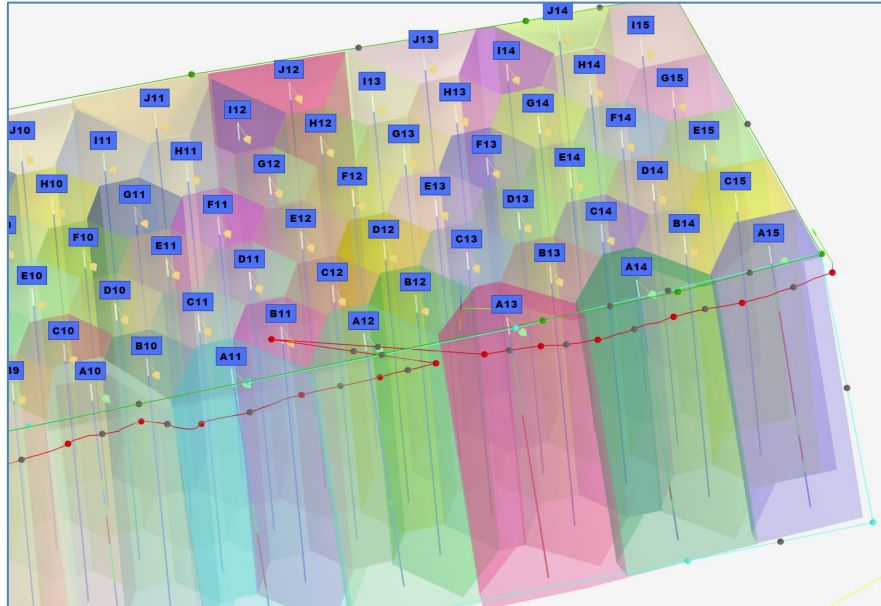
Displays the **Depth** of the selected hole. This is the vertical height from the collar to the toe.

13.5.4 Length (m)

Displays the **Length** along the selected hole.

13.6 Volume

13.6.1 Show volume



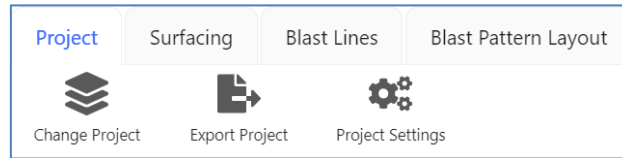
Graphically display the shape of the volume of each selected hole in the **3D View**. The shape is established by starting with every hole and simultaneously expanding each outwards, until meeting:

- The volume of an adjacent hole.
- The edge of the **Blast Boundary**.
- The depth of the hole.
- The limits of the **Volume Cutoff Radius** (see section 18.3).

13.6.2 Volume (m³)

Displays the calculated volume of a selected hole or the total volume of multiple, selected holes.

14 Project ribbon



14.1 Change Project

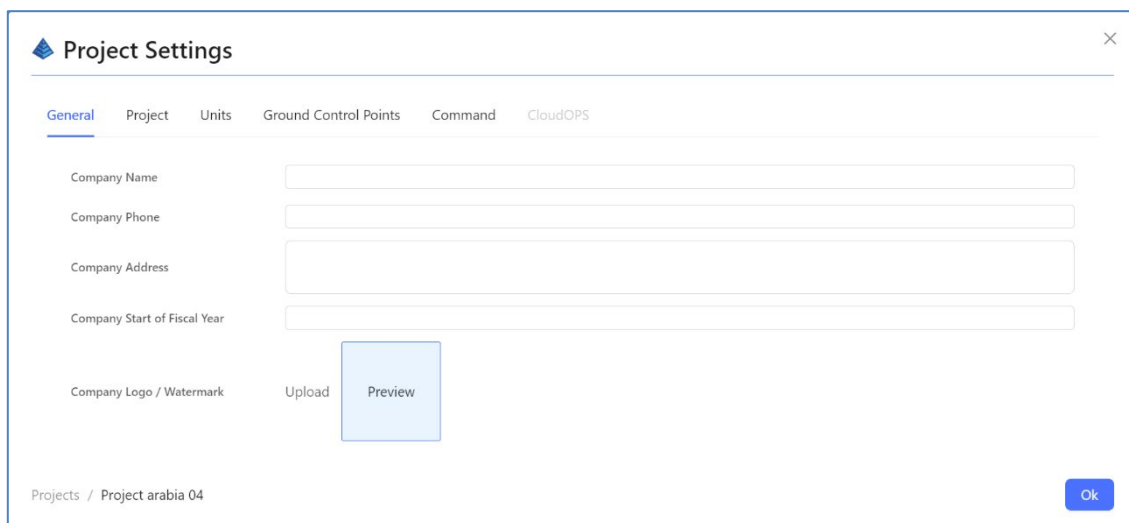
Click **Change Project** to switch **BlastOPS** projects.

14.2 Export Project

Click **Export Project** to create a compressed (.zip) file of the entire project for importing into **BlastOPS** running on other workstations.

14.3 Project Settings

Click **Project Settings** to open the **Project Settings** window.



Use the **Project Settings** window to configure various project-level settings. The settings are arranged by tabs.

14.3.1 General

Input company information such as name, phone, address, and logo. These fields will be used by the report generator to customise deliverables from **BlastOPS**.

14.3.2 Project

Enter site name, operator name, and project notes as required. These fields will be used by the report generator to customise deliverables from **BlastOPS**.

14.3.3 Units

Define the units and projection system used by **BlastOPS** for this project only.

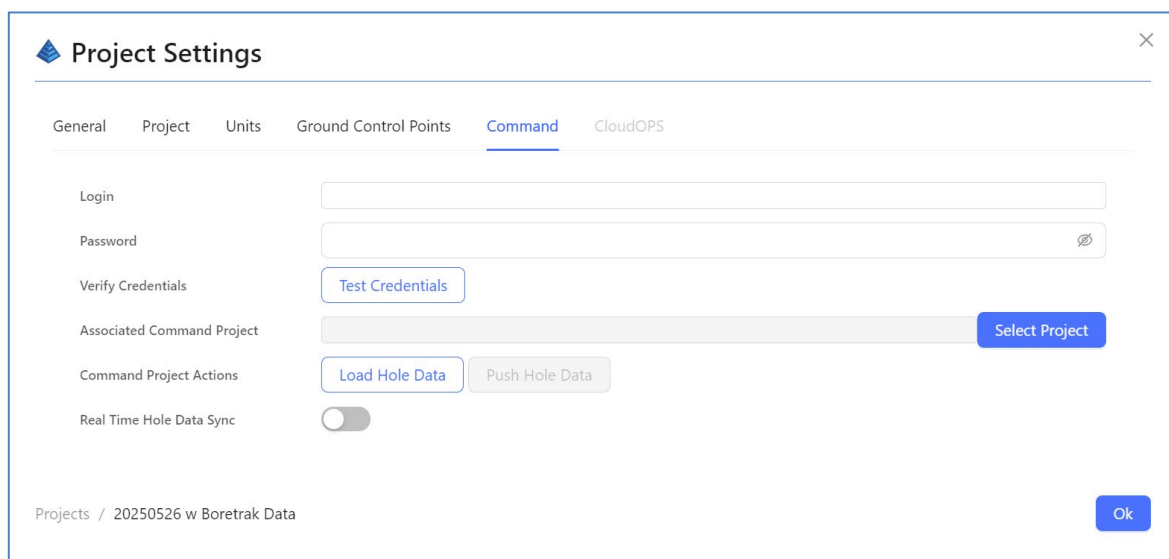
Note that a projection system is required to show satellite images in **Blast Design**.

14.3.4 Ground Control points

Ground Control Points are required to process data from a Quarryman unit. These points can be added, imported, edited, and removed using this tab.

14.3.5 Command

Enter **Carlson Command** login information. This allows a user to connect to **Carlson Command** in order to transfer data between the office and field.

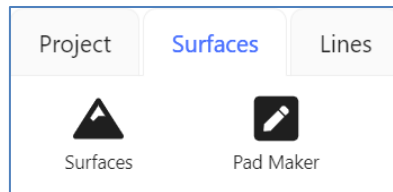


The screenshot shows the 'Project Settings' dialog box with the 'Command' tab selected. The dialog has a title bar with a close button (X) and a tab bar with options: General, Project, Units, Ground Control Points, Command (selected), and CloudOPS. The main area contains the following fields and controls:

- Login:** A text input field.
- Password:** A text input field with a toggle icon on the right.
- Verify Credentials:** A button labeled 'Test Credentials'.
- Associated Command Project:** A dropdown menu with a 'Select Project' button to its right.
- Command Project Actions:** Two buttons: 'Load Hole Data' and 'Push Hole Data'.
- Real Time Hole Data Sync:** A toggle switch.

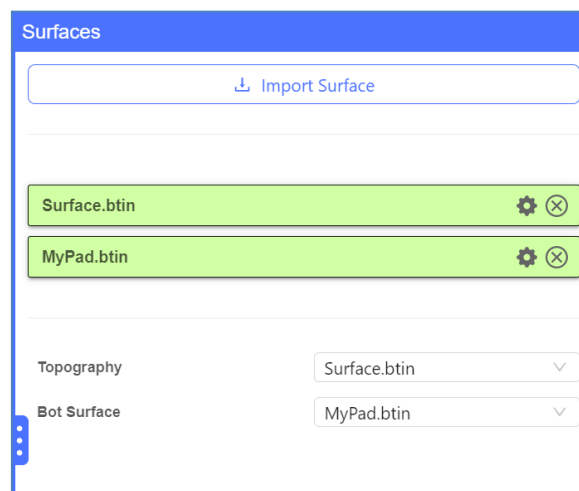
At the bottom left, it says 'Projects / 20250526 w Boretrak Data'. At the bottom right, there is an 'Ok' button.

15 Surfaces ribbon



15.1 Surfaces

Click the **Surfaces** button to open the **Surfaces Panel** on the right side of the screen.



15.1.1 Import surface

Click the **Import Surface** button to open one or more surface files to import. If multiple surfaces are imported at the same once; **Blast Design** will automatically merge the files into one surface.

Currently supported surface file types are:

- **OBJ:** OBJ file (*.obj)
- **GLTF:** GLTF file (*.gltf)
- **GLB:** GLB file (*.glb)
- **DXF:** DXF file (*.dxf)
- **TIN:** TIN file (*.tin)
- **STL:** STL file (*.stl)
- **PLY:** PLY file (*.ply)

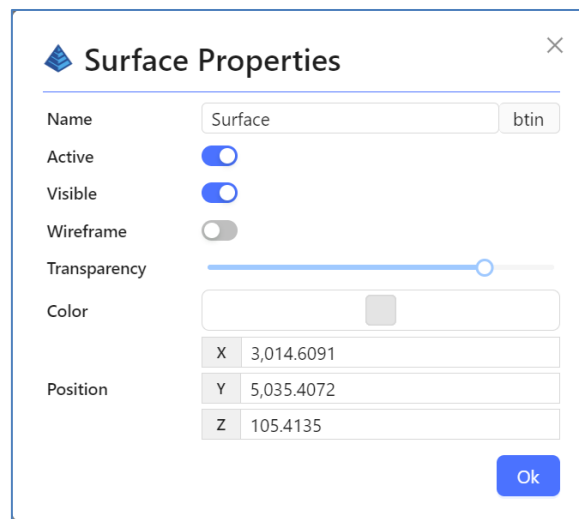
15.1.2 Active surface



Available surfaces are listed and active surfaces are highlighted green.

Click the **Delete** icon to remove a surface from the project.

Click the **Settings** icon against each surface to enter the **Surface Properties** menu.



Use the tools in this window to configure the appearance of the surface in the **3D View**. The **Surface Properties** menu can also be accessed by right-clicking the surface in the **3D View**, or in the **Scene Explorer**.

15.1.3 Topography

Select a surface from the **Topography** drop-down list. The drop-down list includes all active surfaces.

The selected surface is used for burden calculations and pattern generation.

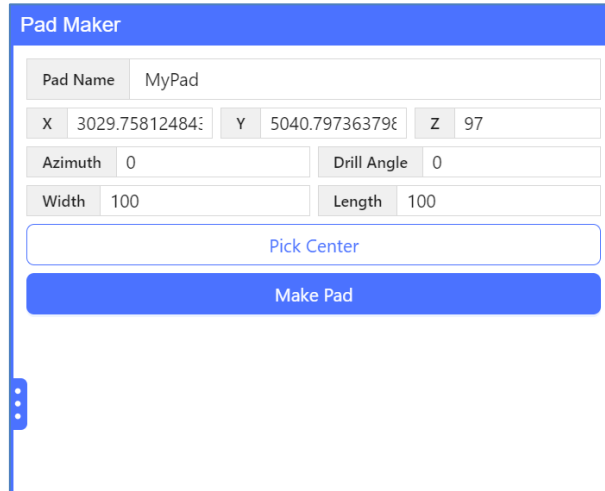
15.1.4 Bot Surface

Select a surface from the **Bot surface** drop-down list. The drop-down list includes all active surfaces.

The selected surface is used as the design floor and can be used by the pattern generation tool to define the toe depths. For further information see section 17.3.

15.2 Pad Maker

A pad can be generated to be used as a reference surface when designing the blast pattern, or the drill loading template. Click **Pad Maker** to open the **Pad Maker Panel** on the right side of the screen.



The Pad Maker panel is a form with a blue header. It contains several input fields: 'Pad Name' (MyPad), 'X' (3029.75812484), 'Y' (5040.79736379), 'Z' (97), 'Azimuth' (0), 'Drill Angle' (0), 'Width' (100), and 'Length' (100). Below these fields are two buttons: 'Pick Center' (light blue) and 'Make Pad' (dark blue). A vertical ellipsis menu is visible on the left side of the panel.

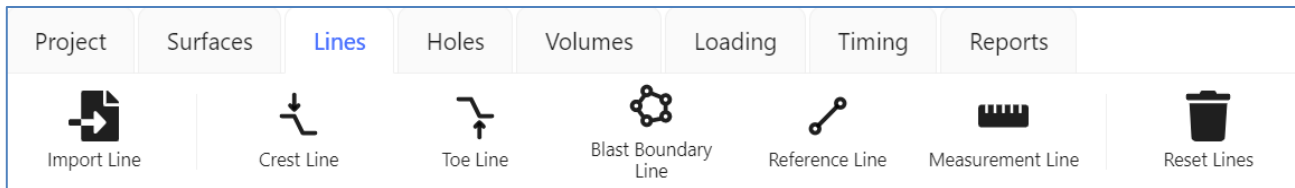
To generate a pad, configure the details:

- **Pad Name:** change the name of the pad.
- **X, Y, Z:** Inputs for the centre point of the pad.
- **Azimuth:** Input for direction of the pad..
- **Drill Angle:** Input for the inclination of the pad.
- **Width/Length:** Input for the size of the pad.

Click **Pick Center** to locate the **X,Y,Z** coordinates for the pad in the **3D View**. This coordinate must intersect with another surface or hole for placement. Use the mouse to pick the coordinate.

Click **Make Pad** to create and add the surface to the project. If no bottom surface is already assigned, the first pad created is automatically assigned as the bottom design surface.

16 Lines ribbon



The **Lines** ribbon offers tools to draw reference lines and to establish working limits in the active project.

At the minimum, a crest must be drawn in order to advance to laying out a blast pattern.

16.1 Import Line

Any of the line types mentioned below can be imported into the **BlastOPS** project as a TXT, DXF or CRD file. Click **Line From Data** and configure the import as required.

16.2 Crest Line

Click **Crest Line** to layout the desired crest on your selected surface. The **Crest Line** can also be used as the back line.

The purpose of the **Crest Line** in **BlastOPS**:

- Together with the **Toe Line**, defines the extents of the area in which **BlastOPS** searches for burdens.
- Forms the upper boundary of the **Burden Vision** surface.
- Can be used to define the elevation of hole collars.
- Defines the orientation of the face and, in turn, the orientation of the **Pattern** layout.

The **3D View** cannot be rotated during use of the **Crest Line** tool. Therefore, before you click **Crest Line**, position the reference surface in the **3D View** with the bench fully visible.

Left click with the mouse to indicate the vertices of the line. The line is draped across the selected surface between vertices. Right-click to finish the selection.

At this point the scene in the **3D View** can be moved again, and the line can be edited.

The **Crest Line** is composed of:

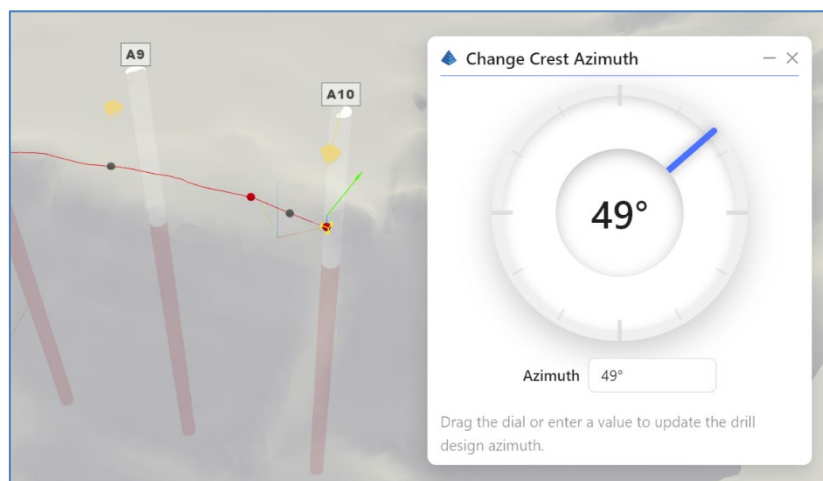


- **Red Nodes:** the original vertices laid out. Can be moved by holding down the left button on the mouse and dragging.

- **Grey Nodes:** centre points between vertices. By moving this node, it will become a vertex, and create 2 additional centre points on both sides of the node.
- **End Vertices:** the green arrow at either end indicates the direction in which the pattern will be laid out.

Right-click on the **Crest Line** to open a context menu offering further editing tools:

- **Edit line data:** open a table of the vertex coordinates to edit, add, delete or import points.
- **Export line:** export the crest as a TXT, CSV or DXF line.
- **Delete line:** delete the **Crest Line**.
- **Insert vertices:** add additional vertices.
- **Toggle coordinates:** turn on a display of the vertices X,Y,Z values in the **3D View**.
- **Toggle measurements:** turn on a display of the length and heading of each section of the **Crest Line**.
- **Change Crest Azimuth:** the **Change Crest Azimuth** dialog appears. Drag the dial to rotate the green arrow at each end of the crest.



16.3 Toe Line

Click **Toe Line** to layout the desired toe on your selected surface.

The purpose of the **Toe Line** in **BlastOPS**:

- Together with the **Crest Line**, defines the extents of the area in which **BlastOPS** searches for burdens.
- Forms the lower boundary of the **Burden Vision** surface.
- Can be used to define the elevation of hole toes.
- Can be used as a reference for adding subdrill to the hole layout.

The **3D View** cannot be rotated during use of the **Toe Line** tool. Therefore, before you click **Toe Line**, position the reference surface in the **3D View** with the bench fully visible.

Left click with the mouse to indicate the vertices of the line. The line is draped across the selected surface between vertices. Right-click to finish the selection.

At this point the scene in the **3D View** can be moved again, and the line can be edited.

The **Toe Line** is composed of:

- **Yellow Nodes:** the original vertices laid out. Use the mouse to click and drag the yellow nodes to move them.
- **Grey Nodes:** centre points between vertices. By moving this node, it will become a vertex, and create two additional centre points on both sides of the node.



Right-click on the **Toe Line** to open a context menu offering further editing tools:

- **Edit line data:** open a table of the vertex coordinates to edit, add, delete or import points.
- **Export line:** export the toe as a TXT, CSV or DXF line.
- **Delete line:** delete the **Toe Line**.
- **Insert vertices:** add additional vertices.
- **Toggle coordinates:** turn on a display of the X,Y,Z values of each vertex.
- **Toggle measurements:** turn on a display of the length and heading of each section of the **Toe Line**.
- **Drape / Undrape line from surface:** toggle the line draping function.

16.4 Blast Boundary Line

Click **Blast Boundary Line** to create a line which delineates the bounding area for where the blast pattern will be laid out. Hole collars will only be generated if they fall within the **Blast Boundary Line**.

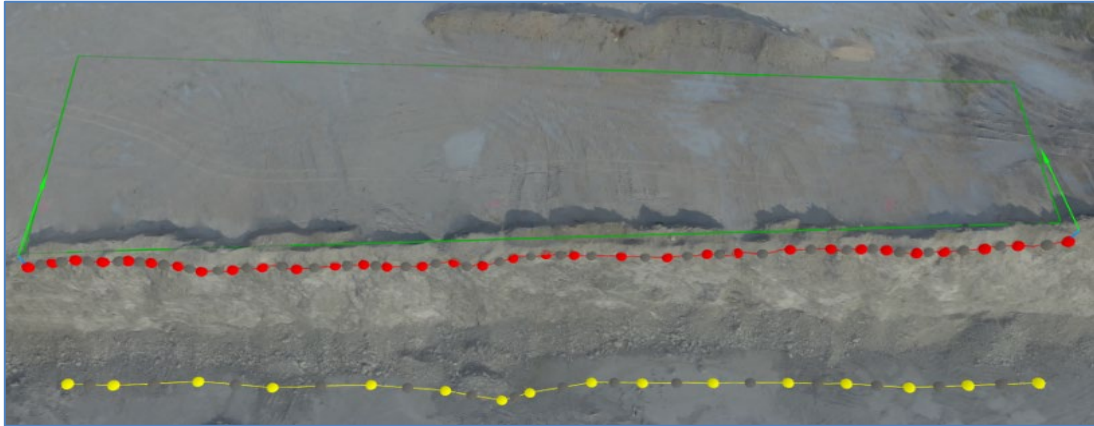
First position the reference surface in the **3D View** so that the desired area is fully visible, as the view locks when the **Boundary Line** tool is clicked.

Left click with the mouse to indicate the vertices of the line. The line is draped across the selected surface between vertices. Right-click to finish the selection.

At this point the **3D View** can be moved again, and the enclosure line can be edited.

The **Blast Boundary Line** is composed of:

- **Green Nodes:** the original vertices laid out. Use the mouse to click and drag the yellow nodes to move them.
- **Grey Nodes:** centre points between vertices. By moving this node, it will become a vertex, and create two additional centre points on both sides of the node.



Right-click on the boundary line to open a context menu offering further editing tools:

- **Edit line data:** open a table of the vertex coordinates to edit, add, delete or import points.
- **Export line:** export the boundary line as a TXT, CSV or DXF line.
- **Delete line:** delete the **Blast Boundary Line**.
- **Insert vertices:** add additional vertices.
- **Toggle coordinates:** turn on a display of the X,Y,Z values of each vertex.
- **Toggle measurements:** turn on a display of the length and heading of each section of the boundary line.

16.5 Reference Line

Draw **Reference Lines** to help align the blast pattern relative to a geological or operational feature or maintain parallelism with constraints such as pit walls or benches.

Left-click with the mouse to indicate the vertices of the line. Right-click to finish the selection.

16.6 Measurement Line

Draw **Measurement lines** to view the extents, azimuth and drill angle between two points.

Left-click with the mouse to indicate the vertices of the line. Right-click to finish the selection.

16.7 Reset Lines

Reset Lines button will erase all available lines under **Scene Explorer > Scene > Lines** including active lines in the **3D View**.

To delete lines individually, right-click on the line in the **3D View** or the **Scene Explorer** then click **Delete Line**.

17 Holes ribbon



The **Holes** ribbon provides tools for designing the drill hole layout for blasting operations. This interface enables users to define the spatial arrangement of blast holes, set hole parameters, and tailor the pattern to match site-specific geology and blasting objectives.

Note: a **Crest Line** must be added to the project before progressing with a blast pattern layout (see section 16.1).

17.1 Import

Import existing hole data into the current **Blast Design** project.

17.1.1 Design

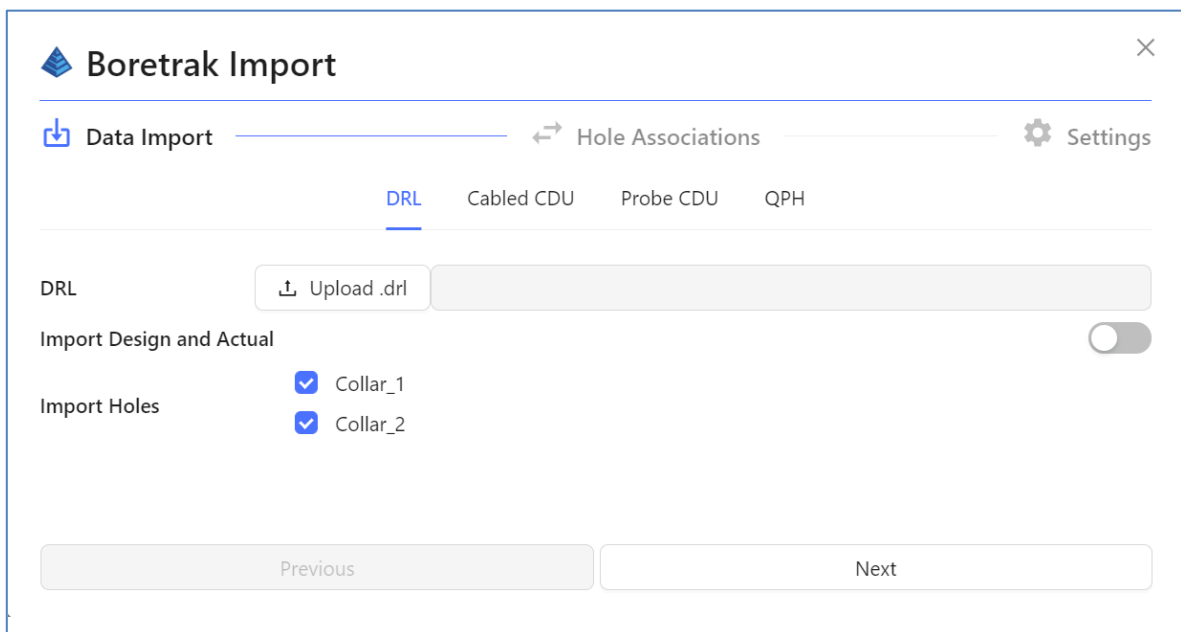
TXT, CSV and CRD files containing design hole Point ID and coordinates (Easting/Northing) can be imported as collar positions.

17.1.2 Surveyed

TXT, CSV and CRD files containing surveyed coordinates from GNSS receivers can be imported as actual measured collar positions. Surveyed holes take priority over design coordinates.

17.1.3 Boretrak

Import Boretrak data which has surveyed the as-built track of the drilled hole, measured in-field. This represents the most accurate borehole measurements. The **Boretrak Import** window appears.



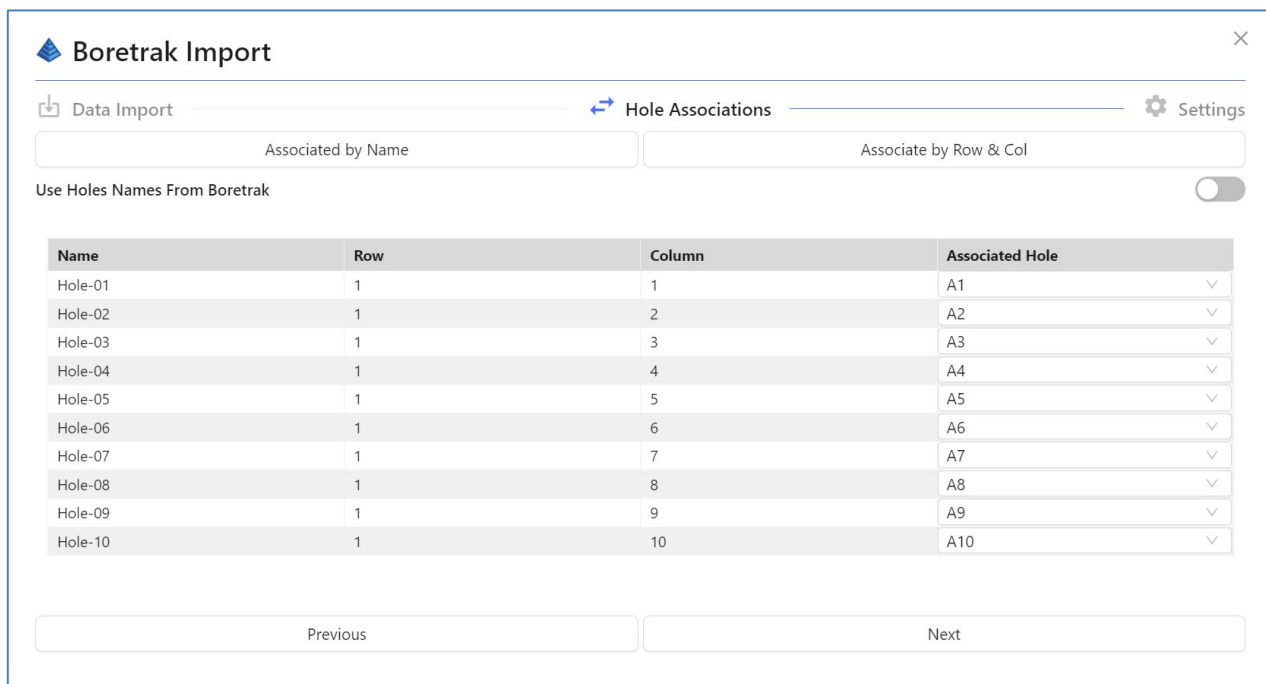
The standard format for data exchange from **Carlson Boretrak** software is DRL. The DRL import is described below. Note that in addition to the DRL format, legacy Boretrak data formats can also be imported:

- **Cabled CDU:** download data directly from a Cabled Boretrak CDU via a serial link to your PC, or select pre-downloaded DAT files from a Cabled Boretrak dataset.
- **Probe CDU:** process DAT files from a Rodded Boretrak. One DAT file from the probe and one from the CDU are required. These must be downloaded via the Boretrak Mobile Android app.
- **QPH:** process a QPH file from a QuarryX project.

On selection of DRL, click **Next**. A window appears allow association of the holes in the DRL file with the design holes or collars already present in the current **Blast Design** project.

- **Associated by Name:** associate holes by name if the names of the holes are the same in the DRL file and the **Blast Design** project.
- **Associate by Row & Column:** associate holes according to the order of the holes in the DRL file and the **Blast Design** project, if the names are not the same in both cases.

A table displays all holes in the imported DRL file. The **Associated Hole column** can be used to manually associate each hole in the DRL file with holes in the **Blast Design** project.



The Boretrak Import dialog box features a title bar with the Carlson logo and a close button. It has two tabs: 'Data Import' (selected) and 'Hole Associations'. A 'Settings' gear icon is in the top right. Below the tabs are two radio buttons: 'Associated by Name' (selected) and 'Associate by Row & Col'. A toggle switch for 'Use Holes Names From Boretrak' is on the right. The main area contains a table with 4 columns: Name, Row, Column, and Associated Hole. The table lists 10 holes (Hole-01 to Hole-10) with Row 1 and Columns 1 to 10. The 'Associated Hole' column shows 'A1' through 'A10' with dropdown arrows. At the bottom are 'Previous' and 'Next' buttons.

Name	Row	Column	Associated Hole
Hole-01	1	1	A1
Hole-02	1	2	A2
Hole-03	1	3	A3
Hole-04	1	4	A4
Hole-05	1	5	A5
Hole-06	1	6	A6
Hole-07	1	7	A7
Hole-08	1	8	A8
Hole-09	1	9	A9
Hole-10	1	10	A10

Click **Next**. A window summarising the holes in the project appears. A graphic shows all holes in plan view. As required, adjust:

- **Assumed Stemming Length**
- **Measurement Interval**
- **Burden Distance.**

These values are all configurable at any time in the **Global Hole Settings** dialog (see section 12).

Boretrak Import

Data Import | Hole Associations | Settings

Map showing hole locations (A1-A10, B1-B10, C1-C10) with coordinates and distances. Centered At (3017.9, 5031.7, 104.9).

Settings:

- Average Boretrak Hole Length (m): 13.605
- Assumed Stemming Length (m): 2
- Measurement Interval (m): 1
- Burden Distance (m): 5

Success: Settings pass all validations

Previous | Finish

Click **Finish** to complete the Boretrak data import.

17.1.4 Collars

converts any hole collars imported from the Cloud Processing module to Blast Design holes.

17.1.5 Machine Control

Import a .DRL file from Carlson's machine control system.

17.2 Pattern Options

Opens a dialog in the right panel.

Pattern Options

Color Options

Design Color:

Surveyed Color:

Boretraked Color:

Set the colour of the **Design**, **Surveyed**, and **Boretrak** data when viewed as Hole Type in **Scene Explorer**.

These colours are also used for the **Show Azimuths** arrows.

17.3 Pattern Layout

Opens a dialog in the right panel.

Pattern Layout

▼ Elevation

Topography

Surface.btin

Collar Elevation Type

Grid Elevation

Toe Elevation Type

Length

Length (m)

50

▼ Geometry

Rows

3

Row Spacing (m)

4

First Burden (m)

4

Columns

Count

10

1st Column Offset (m)

0

▼ Pattern Options

Staggered

☐

Dynamic Layout

☒

Fade Dynamic Layout

☒

1st Straight Row

3

Flip Labels

☐

Use Crest Line as Back Line

☐

▼ Hole Parameters

Hole Diameter (mm)

100

Custom Azimuth (°)

208.12

Drill Angle (°)

0

Dip From Toe

☐

▼ Feathering

Feather Dip

☐

Remove all holes?

Apply Pattern

17.3.1 Elevation

- **Topography:** define the surface from which the elevation measurements will be made.
- **Collar Elevation Type:**
 - **Surface:** match the collar elevation to the selected topographic surface. This requires the surface to extend to where the holes are being designed.
 - **Crest Line:** this uses the **Crest Line** to indicate the elevation of the collars. Typically used with Quarryman scans where only the face profile was surveyed and not the top bench.
- **Toe Elevation Type:** choose which method to determine the position of the hole toe. The selection

determines the following data entry box which must be configured accordingly:

- **Length:** the absolute length of each hole.
- **Depth:** the elevation difference between the collar and toe.
- **Elevation:** the absolute elevation to which the holes will be designed.
- **Surface:** if a pad was created, or a surface imported for design purposes, it can be used so that the hole toe will always extend to the selected surface.
- **Toe line:** the hole toe is perpendicular to the **Toe Line**. A **Toe Line** must have been created for this option to work (see section 16.3).

17.3.2 Geometry

- **Rows:** the desired number of rows in the pattern.
- **Row Spacing (m):** the nominal distance between the rows.
- **First Burden (m):** the distance from the first row from the **Crest Line**.
- **Columns:** the desired number of columns in the pattern.
- **1st Column Offset (m):** the offset distance of the first column. This is measured from the starting point of the **Crest Line**.

17.3.3 Pattern Options

- **Staggered:** collars in one row are offset (staggered) halfway between the collars in the adjacent row.
- **Dynamic Layout:** the front row collar position follows the contour of the **Crest Line**.
- **Fade Dynamic Layout:** reduces the effect of the Dynamic Layout, row by row. A **1st Straight Row text** box appears. Enter the first row that should be straight.
- **Flip Labels:** toggle OFF to have the 1st Column start at the **Crest Line** left marker, or toggle ON to have the 1st Column start at the **Crest Line** right marker.
- **Use Crest Line as Back Line:** if the **Crest Line** is used to indicate the back line of the pattern, this feature should be toggled ON in order to inverse the azimuth of the drill hole (see 17.3.4). The pattern is then generated in front of the **Crest Line**, with additional rows generated towards the face.

17.3.4 Hole Parameters

- **Hole Diameter (mm):** enter the diameter of all holes in millimetres.
- **Custom Azimuth (°):** the azimuth/heading of the generated drill holes. Automatically calculated to be in the direction of the **Crest Line**'s green directional arrow – or inverted when the **Use Crest Line as Back Line** option is turned on.
- **Drill Angle (°):** the inclination of the drill holes. A 0° hole is drilled vertically downwards.
- **Dip From Toe:** toggle OFF for the row spacing to dictate the placement of the collars. Toggle ON for the row spacing to dictate the placement of the toes. This is typically used in conjunction with **Feathering** (see section 17.3.5).

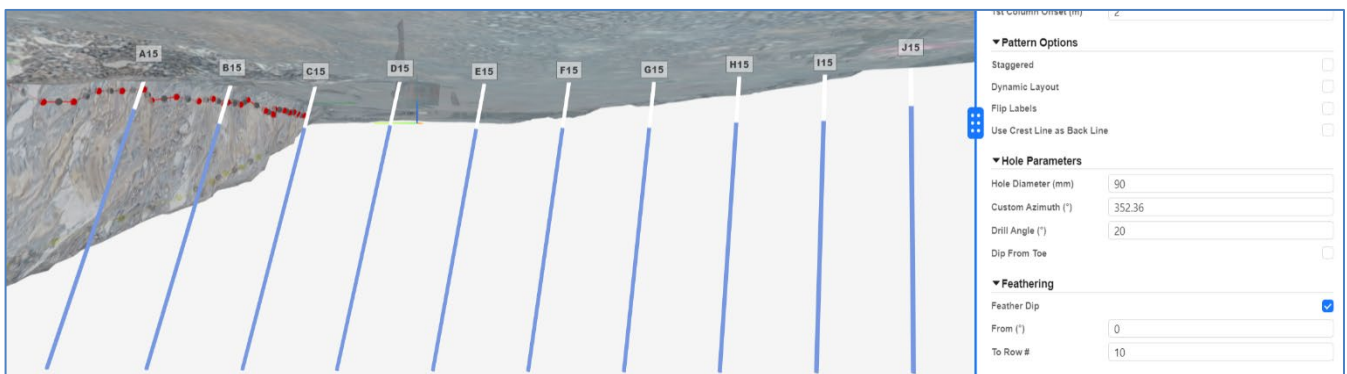
17.3.5 Feathering

- **Feather Dip:** toggle OFF to maintain the inclination entered in **Hole Parameters** for all rows. Toggle ON to gradually change the inclination from the inclination entered in **Hole Parameters**, row by row to a specified inclination and row.

Two options appear if **Feather Dip** is ON:

- **From:** specify the desired inclination of the **To Row**.
- **To Row:** specify the desired row to which the inclination will be graduated. This row, and subsequent rows, will be inclined to the value in the **From** field.

Below shows starting dip of 0° that is applied from row 10 (J#). The drill angle gradually increases row-to-row by ~2° until it reaches the nominal drill angle of 20° for all the holes in the front row (A#).



17.4 Hole Data Table

The **Hole Data Table** provides an editable table showing all parameters of every drill hole in the current blast design.

The table consolidates the geometric and positional attributes of each hole into a single, structured interface, allowing users to review, validate, and update hole information efficiently.

Hole Data Table													
Hole Geometry													
Most Correct													
Labels	Type	Drill Angle	Azimuth	Length	Depth	Collar Easting	Collar Northing	Collar Elevation	Bottom Easting	Bottom Northing	Bottom Elevation	Delete	
✓ A1	Design	12	207.12	11.91	11.65	2994.98	5045.53	111.24	2993.81	5043.34	99.59		
✓ A2	Design	12	207.12	11.87	11.61	3000.85	5044.73	111.2	2999.69	5042.56	99.59		
✓ A3	Design	12	207.12	11.61	11.36	3005.54	5041.74	111.19	3004.4	5039.61	99.83		
✓ A4	Design	12	207.12	4.91	4.8	3010.41	5039.07	111.15	3009.93	5038.17	106.35		
✓ A5	Design	12	207.12	13.11	12.82	3015	5035.89	111.27	3013.71	5033.48	98.45		
✓ A6	Design	12	207.12	13.41	13.12	3019.65	5032.82	111.26	3018.34	5030.36	98.14		
✓ A7	Design	12	207.12	13.29	13	3024.64	5030.37	111.31	3023.34	5027.94	98.31		
✓ B1	Design	6	207.12	11.71	11.65	2996.86	5049.05	111.24	2996.29	5047.97	99.59		
✓ B8	Design	6	207.12	12.66	12.59	3031.08	5030.66	111.21	3030.46	5029.49	98.63		
✓ B9	Design	6	207.12	12.13	12.06	3035.79	5027.69	111.2	3035.19	5026.57	99.14		
✓ B10	Design	6	207.12	11.19	11.13	3040.98	5025.63	111.4	3040.43	5024.6	100.27		
✓ C2	Design	0	208.12	11.7	11.7	3003.64	5049.96	111.29	3003.64	5049.96	99.59		
✓ C3	Design	0	208.12	11.46	11.46	3008.54	5047.34	111.29	3008.54	5047.34	99.83		
												Save CSV Save DRL Ok	

The **Hole Geometry** drop-down list allows a selection between different datasets or geometry sources. This is relevant if multiple versions of the hole have been used in the project, for example after importing GPS survey or

Boretrak data.

The options are:

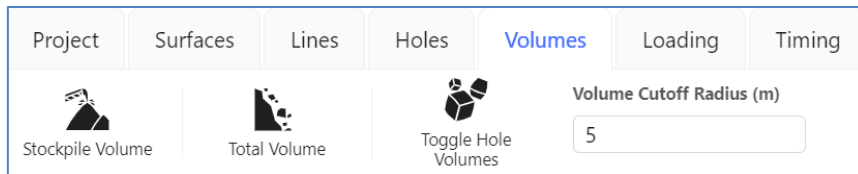
- **Most correct:** prioritises real world measured data first.
- **All**
- **Design**
- **Surveyed**
- **Boretrak**

Save CSV and **Save DRL** buttons export hole geometry for drill rig guidance systems, integration with other blast planning tools and QA/QC reporting.

17.5 Push Pattern To Command

Push Pattern To Command uses the **Carlson Command** login (see section 14.3.5) to sync with the cloud.

18 Volumes ribbon

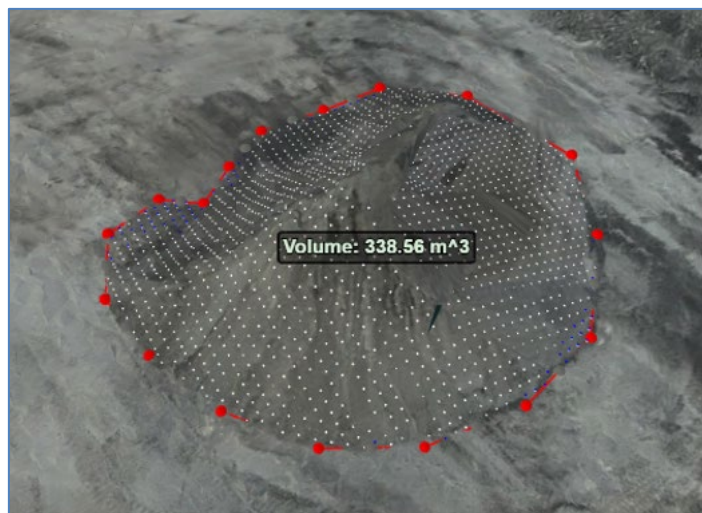


The **Volumes** ribbon provides the user with tools to visualize the blast patterns total volume as well as to inspect the volume of a stockpile.

18.1 Stockpile Volume

The **Stockpile Volume** feature calculates the volume of a stockpile.

Press **Stockpile Volume** and use the mouse to delineate a polygon around the bounds of the stockpile. The volume is automatically calculated and shown in a UI label in the center of the polygon.



Adjust the vertices of the polygon and the volume automatically recalculates, and the label updates.

To delete the stockpile volume, either right-click the boundary line and select **Delete Line**, or delete the volume from the **Scene Explorer**.

18.2 Total Volume

Click **Total Volume** to enable or disable the visualization of the total volume encompassed by the current pattern layout.

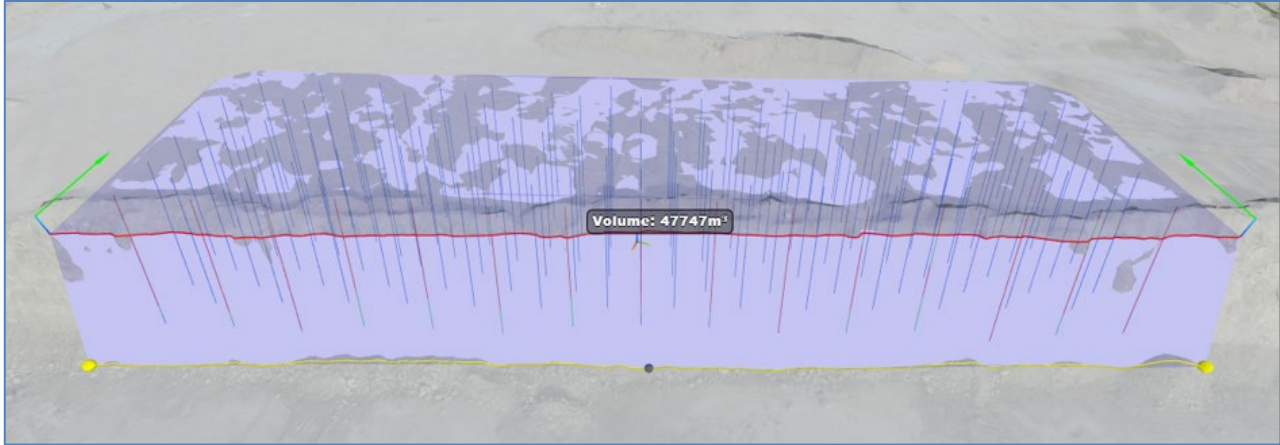
The volume is calculated using the following bounds:

- The tops and bottoms of every visible hole.
- The crest and toe lines if they are both present.
- The **Blast Inclusion Line**.

If a hole has both Boretrak and design data, the Boretrak data is used for the volume calculation.

The volume is automatically recalculated in the background as adjustments are made to the pattern.

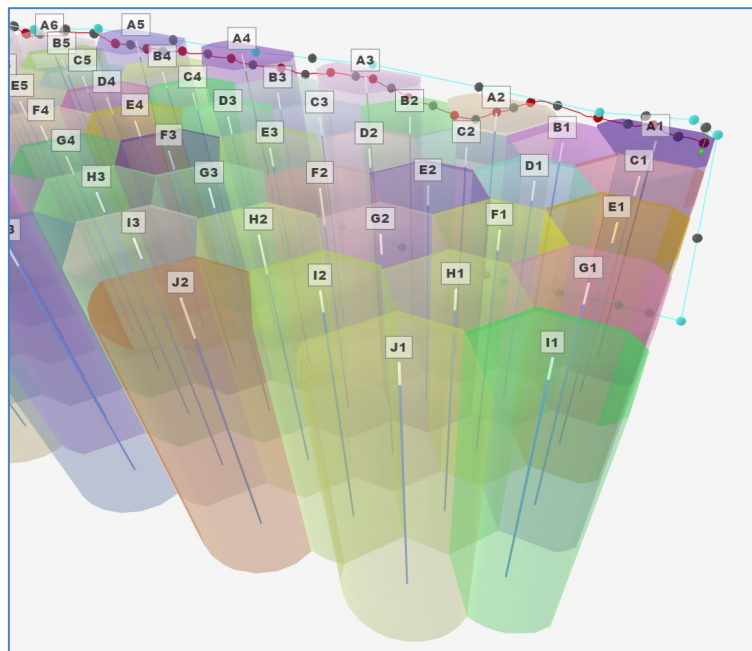
The **Total Volume** is also displayed at the bottom of the screen in the **Info Tray**.



18.3 Toggle Hole Volumes

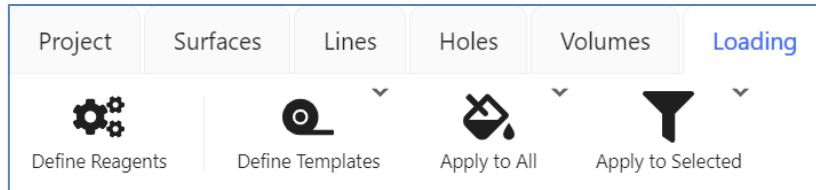
Graphically display the shape of the volume of each selected hole in the **3D View**. The shape is established by starting with every hole and simultaneously expanding each outwards, until meeting:

- The volume of an adjacent hole.
- The edge of the **Blast Boundary**.
- The depth of the hole.
- The limits of the **Volume Cutoff Radius**.



Enter an appropriate **Volume Cutoff Radius** to limit the volume calculation around each hole.

19 Loading ribbon

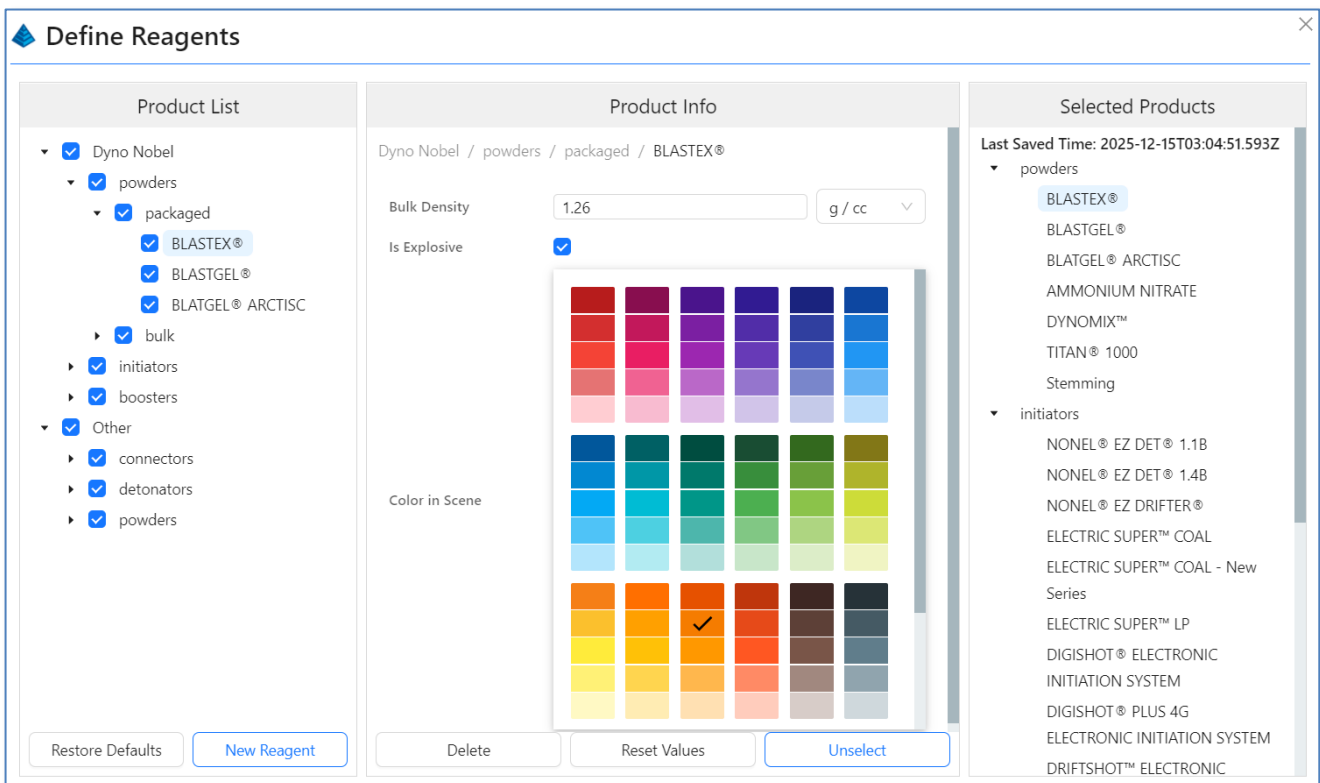


The **Loading** ribbon provides tools required to design, manage, and apply loading configurations to the blast pattern. This module allows users to define explosive products, create or modify loading templates, assign loading designs to individual or multiple holes.

By centralising all loading-related functions, the **Loading** ribbon ensures accurate quantity calculations, and consistent charging methodology.

19.1 Define Reagents

The **Define Reagents** window allows users to manage all explosive products, initiators, boosters, connectors, and stemming materials used within the blast loading design. This feature provides a centralised interface for selecting, editing, organising, and adding reagents to be used in loading templates and drill hole designs.



The **Product List** panel displays all available reagents grouped by manufacturer, type, and sub-type, enabling users to quickly navigate and filter products.

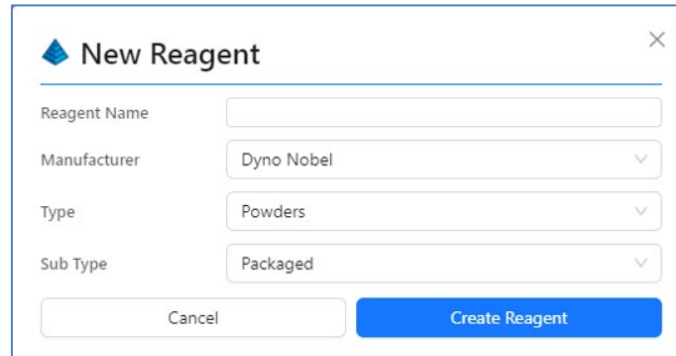
The **Selected Products** panel on the right shows all items currently active for use in loading operations.

Select an item to reveal its detailed properties in the **Product Info** panel. From here, edit attributes:

- **Bulk Density:** edit the bulk density and unit of measurement.
- **Explosive:** toggle the explosive classification.
- **Color in Scene:** adjust colour-coding for visual clarity in the **3D View**.

Additional tools available:

- **Restore Defaults:** restore the software's default reagent library.
- **New Reagents:** add new reagents.



New Reagent

Reagent Name

Manufacturer

Type

Sub Type

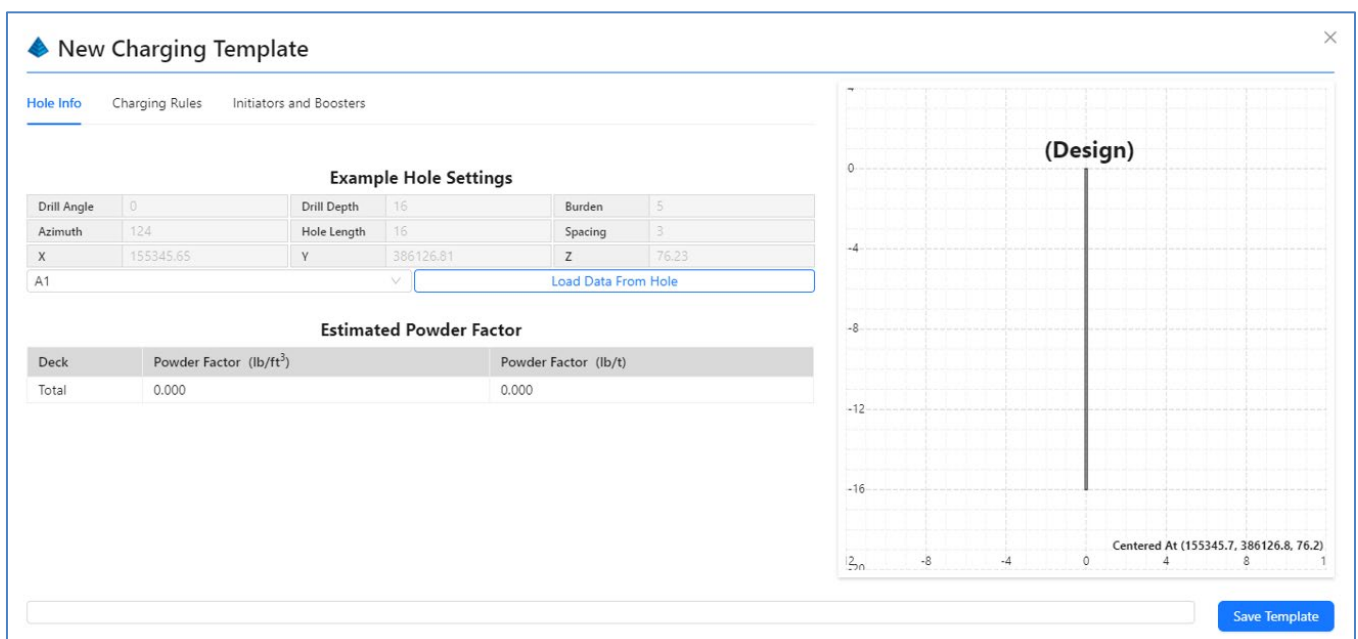
- **Delete:** remove an existing product.

19.2 Define Templates

Use **Define Templates** to create, view, and modify drill hole loading templates.

Loading templates define how explosives, stemming, initiators, and boosters are distributed within a drill hole and provide a consistent charging methodology that can be applied across multiple holes in a blast pattern.

The **New Charging Template** window appears, organised into three tabs:



New Charging Template

Hole Info | Charging Rules | Initiators and Boosters

Example Hole Settings

Drill Angle	0	Drill Depth	16	Burden	5
Azimuth	124	Hole Length	16	Spacing	3
X	155345.65	Y	386126.81	Z	76.23

A1

Estimated Powder Factor

Deck	Powder Factor (lb/ft ³)	Powder Factor (lb/t)
Total	0.000	0.000

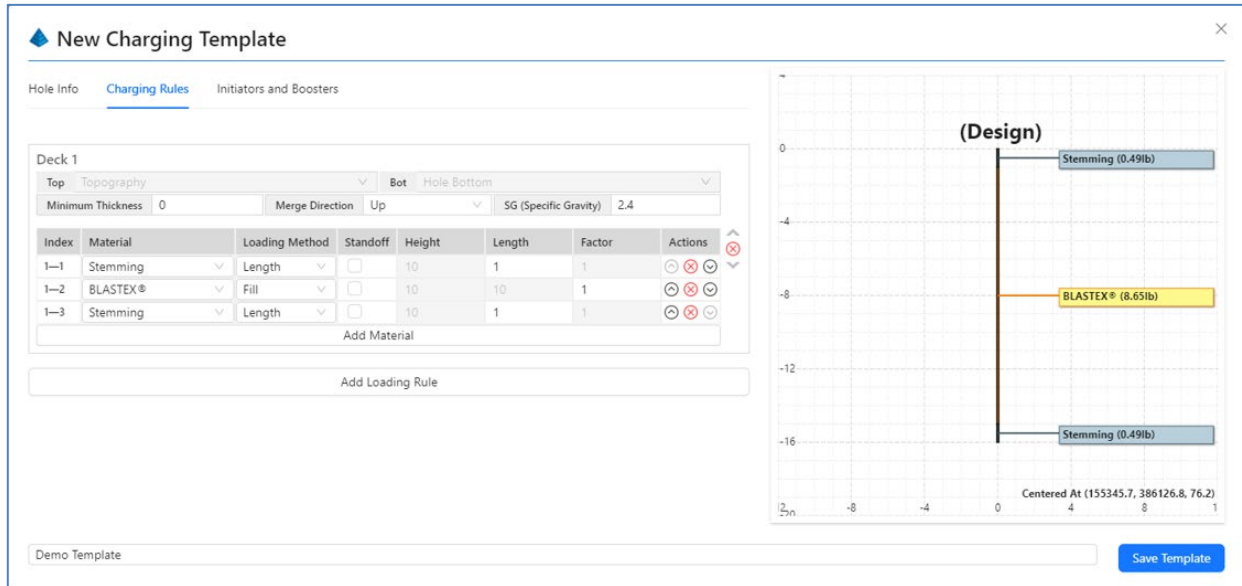
(Design)

Centered At (155345.7, 386126.8, 76.2)

19.2.1 Hole Info

Hole Info displays reference hole geometry and calculated parameters used to preview the loading design, including drill angle, depth etc. An **Estimated Powder Factor** is also calculated. Load data from an existing hole to visualise the template against realistic hole conditions.

19.2.2 Charging Rules

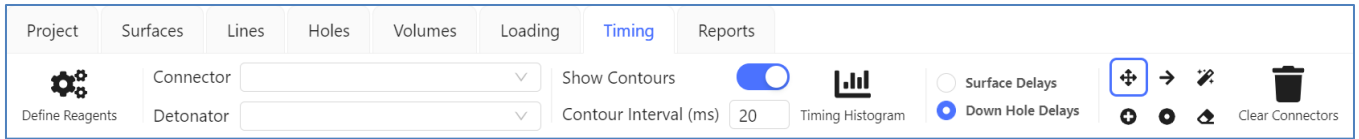


Click **Add Loading Rule** to add a new index to the list:

- **Material:** a drop-down menu listing the available powders and bulk materials from the **Define Reagents** window can be chosen here.
- **Loading Method:** options of **Length**, **Height**, and **Fill**. One index must be listed as **Fill**.
 - **Length:** the absolute length along the hole (inclined or vertical).
 - **Height:** the elevation difference along the hole.
 - **Fill:** fills the remaining length of the hole.
- **Standoff:** if unselected, the index will remain within the designated limitation of the surfaces. If selected, the index will populate outside of the designated limitation of the surfaces.
- **Height/Length:** unit value determining the occupancy relative to the hole.
- **Actions:** gives the ability to move the Index up or down, as well as deletion.

There is also the option to provide a **Minimum Thickness** related to pinch outs. If an index is less than the minimum thickness, it will be merged either up or down. Whether it gets merged up or down is controlled by the selected **Merge Direction**.

20 Timing ribbon



On selecting the **Timing** ribbon, the **3D View** reverts to **Plan** view to allow clear interaction with the holes.

20.1 Define Reagents

All connectors and detonators selected from the **Define Reagents** window are available in the connector and detonator drop-down lists. (See section 19.1 for more details).

20.2 Connector and Detonator

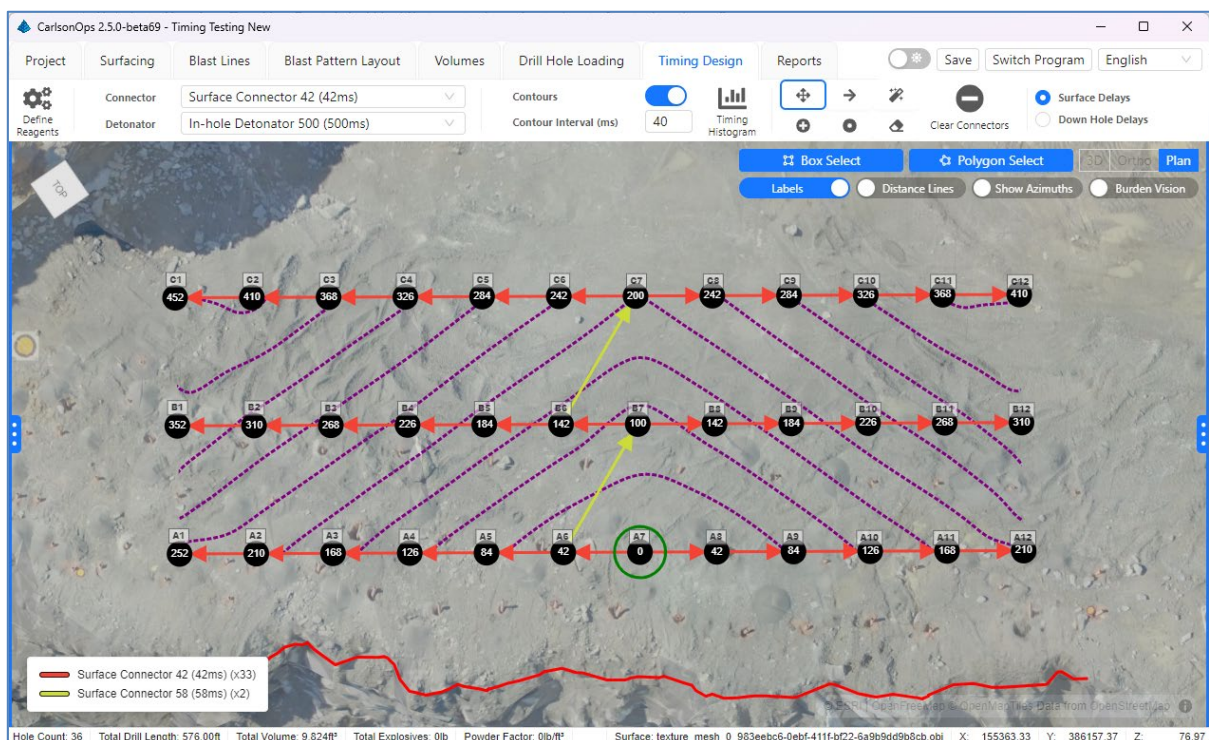
The **Connector** drop-down allows a selection of the connector which is drawn by the **Add Connector** and **Smart Connector** tools.

The **Detonator** drop-down allows a selection of the detonator to be used for the shot. The **Detonator** can be changed at any time. Note that the selected detonator must be the same for every hole in the shot.

20.3 Contour Controls

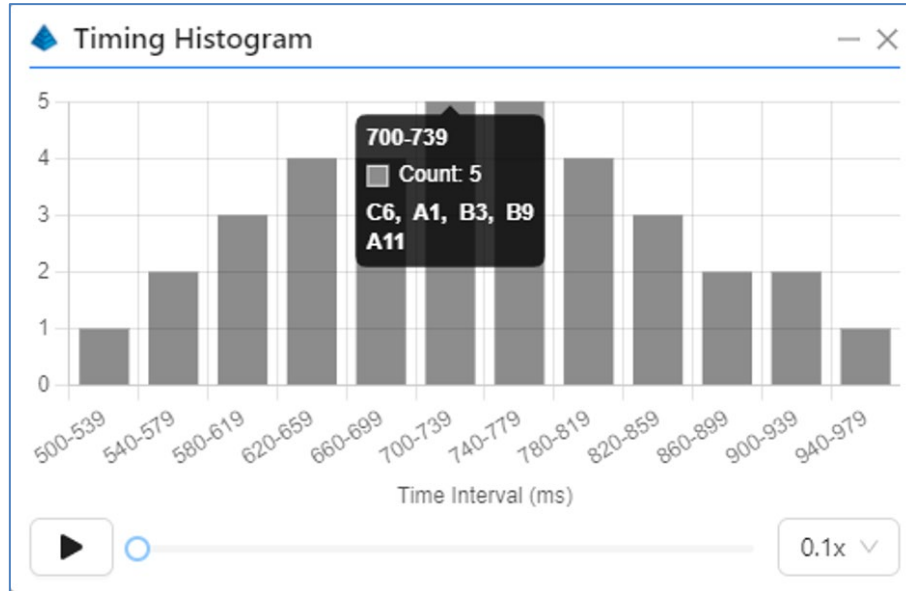
Turn the **Contours** switch ON and OFF to toggle the visualisation of the timing contour lines in the scene.

Enter a value in the **Contour Interval** field to change the amount of time (in milliseconds) between each contour. In the example below, there is 40ms between each contour line.

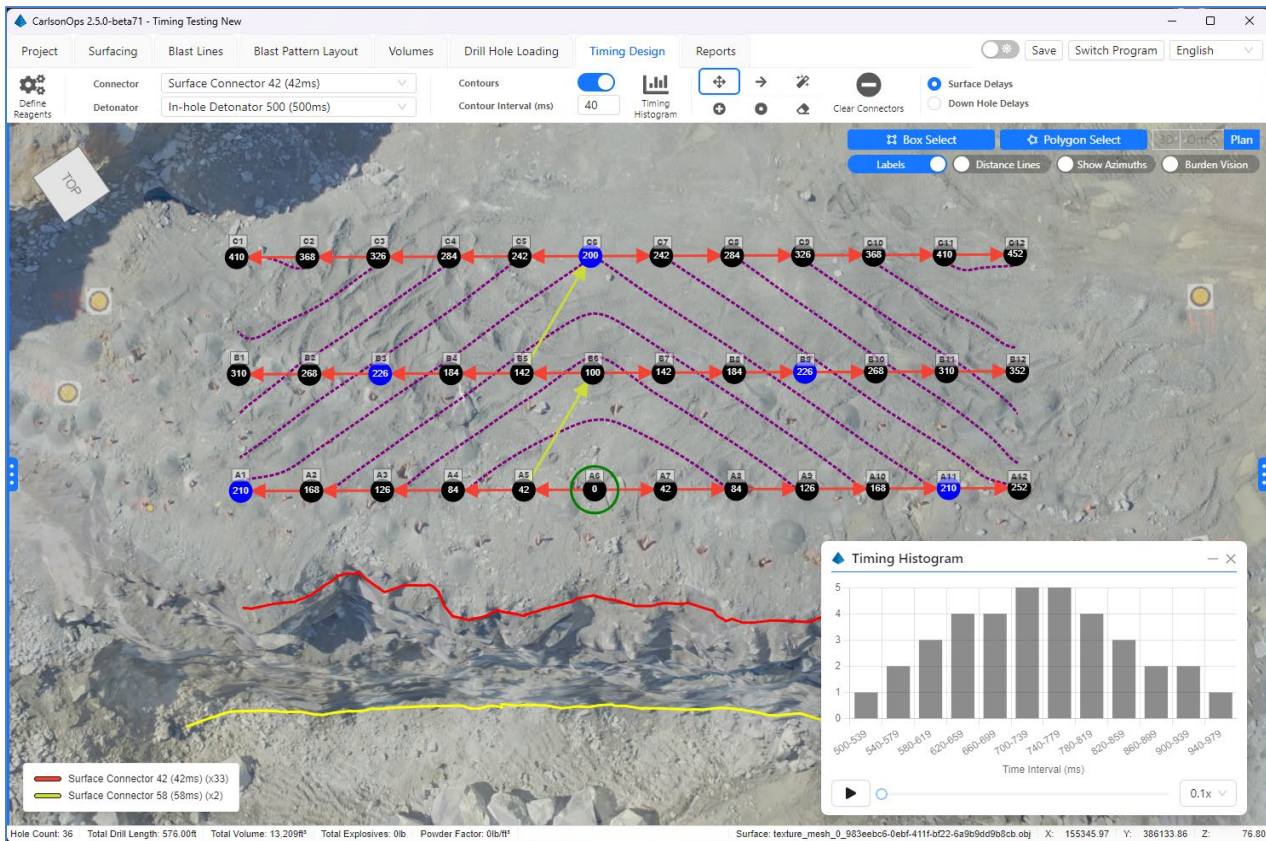


20.4 Timing Histogram

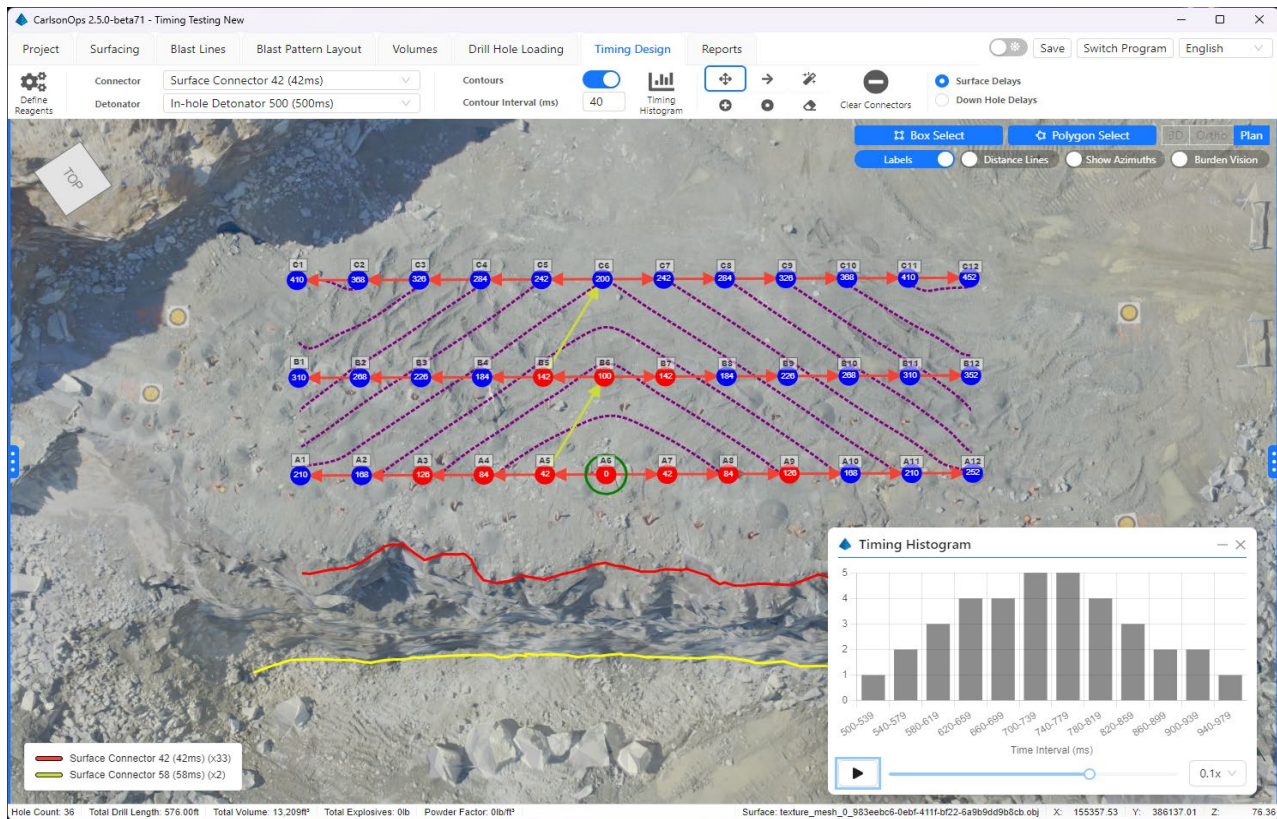
Press the **Timing Histogram** button to open the **Timing Histogram** window. Use the tools within this window for a better understanding of the hole overlaps in your current tie-up. The histogram separates holes into bins using the **Contour Interval** setting.



Hover over a bin to display the count and labels of the holes that are initiated during that bin. Press the bin to highlight the selected holes as blue in the scene.



To understand how the entire timing will play out, use the playback controls at the bottom of the modal to scrub through the entire tie-up.



Holes are highlighted blue once their surface delay has been reached (initiated), and then red once their down hole delay has been reached (detonated).

20.1 Delay Controls

Use the **Surface Delays** and **Down Hole Delays** options to change which delay is displayed on each hole in the scene.

Surface Delays are the connector-only delays between each hole.

Down Hole Delays represent the sum of the surface delays and the detonator delay in each hole. This is therefore the actual delay to the detonation of each hole.

20.2 Tie-up Tools

The **Tie-up** tools section includes all of the tools required to add connectors between holes, add dummy timing points, and set initiation points.

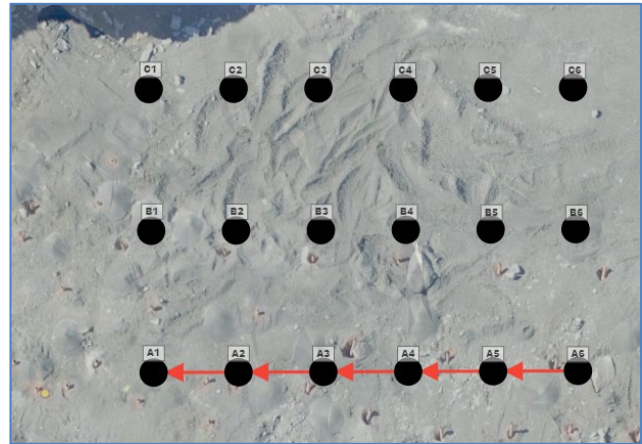


20.2.1 Move

The **Move Tool** allows the user to pan, zoom, and rotate the camera. Other tools lock the camera view.

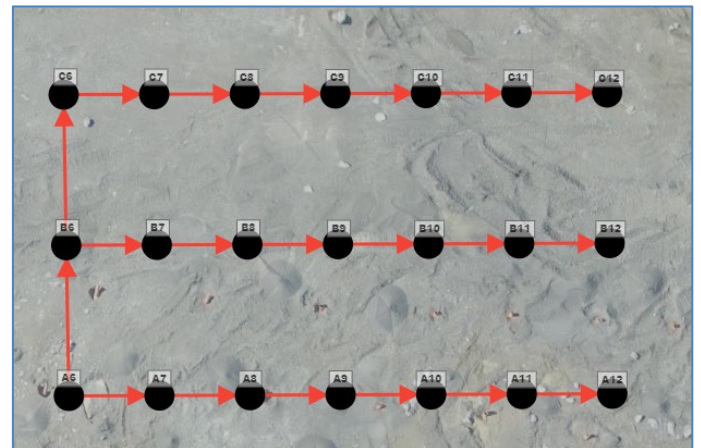
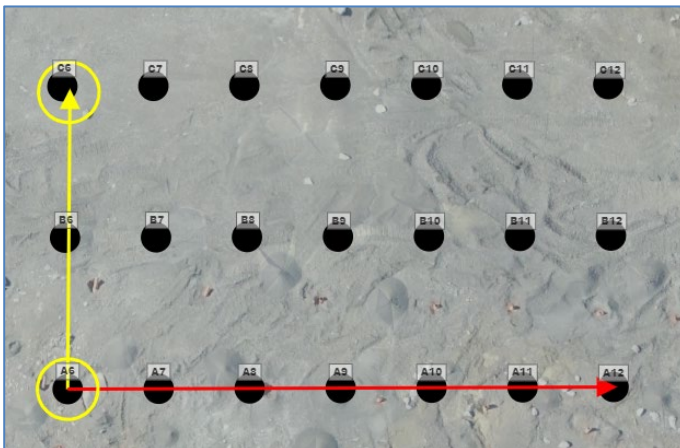
20.2.2 Add Connector

The **Add Connector Tool** adds connectors between two or more holes. Click on the hole from which the connector will start, then click a second hole where the connector will stop. Any holes between the first and second click will be connected together.



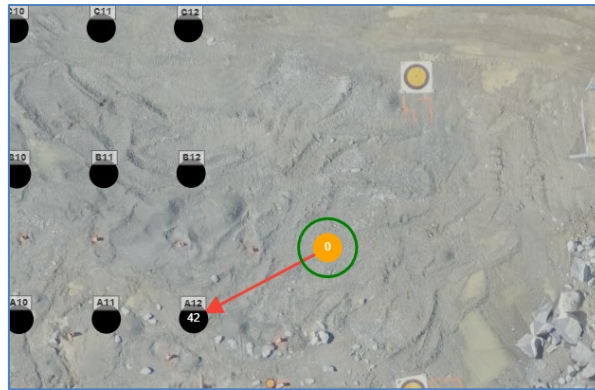
20.2.3 Smart Connector

Use the **Smart Connector Tool** to connect a grid of holes. This can be used to tie-up a larger section of the pattern at once. Choose a hole and connect a row, then choose another hole in a different row and the same holes in that row will all be connected together.



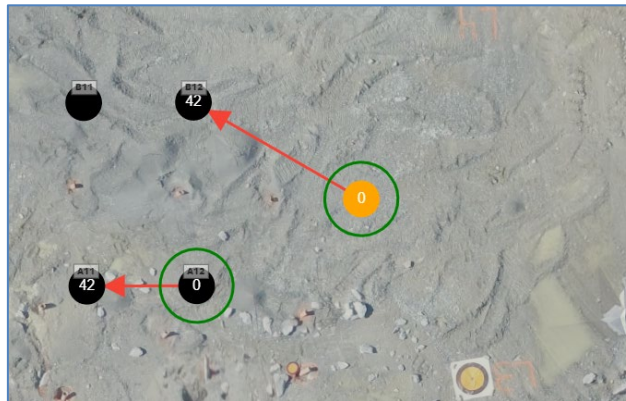
20.2.4 Add Dummy Point

Use the **Add Dummy Point Tool** to add timing points that don't have an associated hole. These points can be connected to and set as initiation points just like any other timing point. Dummy timing points will be shown in orange to distinguish them from holes.



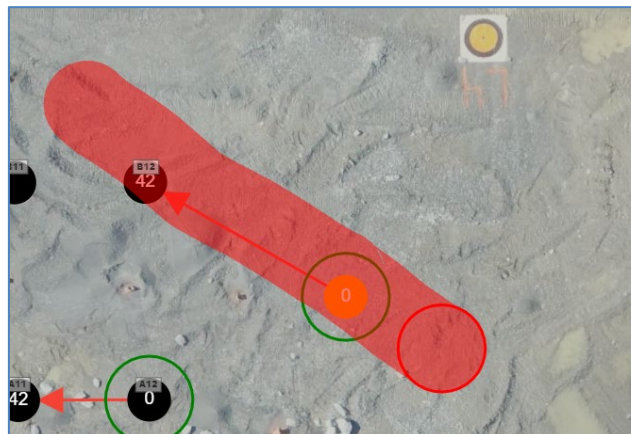
20.2.5 Initiation Point

Use the **Initiation Point Tool** to choose one or more holes as initiator points. Timing points marked as initiators will have a green circle around them and a start delay of zero milliseconds.



20.2.6 Connector Eraser

The **Connector Eraser Tool** allows the user to remove connectors and dummy timing points from the scene. Simply draw over the connectors and points you want to remove by holding down the left mouse button.



20.3 Clear Connectors

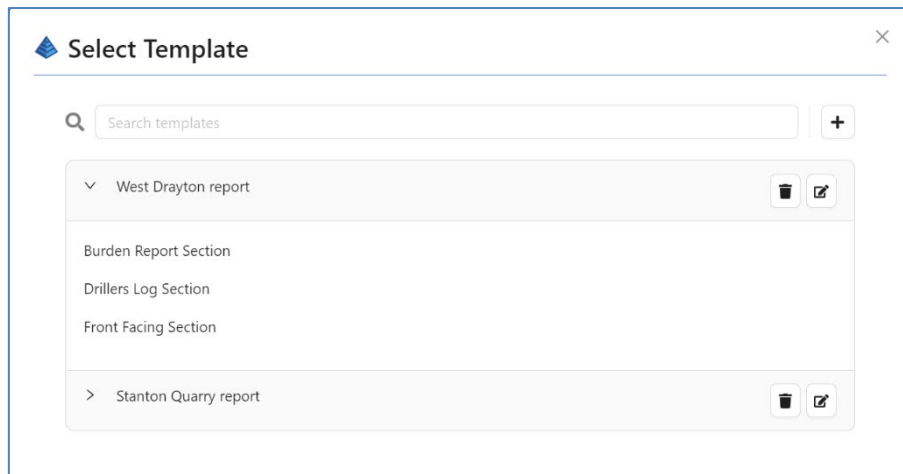
The **Clear Connectors Tool** will remove ALL current connectors in the scene.

21 Reports ribbon



21.1 Template Editor

A report template must be created before generating a report. The **Template Editor** provides tools to make a new template or to edit an existing template. Click **Template Editor** to open the **Select Template** window.



21.1.1 Creating a new template

In the **Select Template** window, click the **Add** button to create a new template. Each existing template can be renamed and edited.

21.1.2 Editing a template

Click **Edit** against an existing template to open the **Report Template Editor** window.

On the left are shown all the sections included in the selected report template.

Right-click on a section and click **Delete** from the context menu to remove the section from the template.

Click **Add Section** to add a new section to the template.

Click on one of the sections in the left panel to see a preview of that part of the report. On the right, each section offers various options to customise the report to meet your project and site requirements. As these options are reconfigured, the preview adjusts accordingly to reflect the changes.

Report Template Editor

Sections

Burden Report Section

Drillers Log Section

Front Facing Section

Plan View Section

Deviation Report Section

Add Section

Preview

Hole

Collar 1

Settings

General

Burden Method

Perp. Planar

Geometries

Design

Header

Burden Chart

Grid

Grid Labels

Burden Labels

Depth Labels

Crest Elevation

Toe Elevation

Reference Elevations

Face

Tolerance Lines

Burden Path

Burden Lines

Mini Map

Grid

Grid Labels

Surface

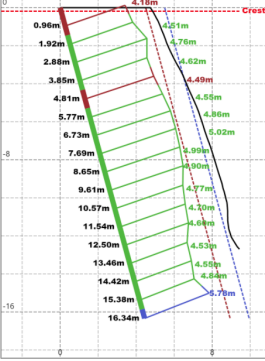
Crest Line

Toe Line

Carlson Software

Burden Report

17/04/2026



Elevation (m)	Depth (m)	Burden (m)
25.70	0.96	4.18
24.74	1.92	4.51
23.78	2.88	4.76
22.82	3.85	4.62
21.86	4.81	4.49
20.90	5.77	4.55
19.93	6.73	4.86
18.97	7.69	5.02
18.01	8.65	4.99
17.05	9.61	4.77
16.09	10.57	4.70
15.13	11.54	4.64
14.17	12.50	4.53
13.21	13.46	4.55
12.24	14.42	4.84
11.28	15.38	5.78
10.32	16.34	

Company: Carlson Software

Site: Carlson back yard

Operation: AntCC

Hole: Collar 1

Hole Type: design

Easting: 56456070.99

Northing: 33876662.96

Elevation: 26.66

Azimuth: 182.83°

Drill Angle: 16.00°

Hole Length: 17.00m

Diameter: 0.500m

Planned Burden: 5.00m

Tolerance: 10%

Critical Burden: 4.50m

Stemming: 0.00m

Excessive Burden: 5.50m

Subdrill: 0.00m

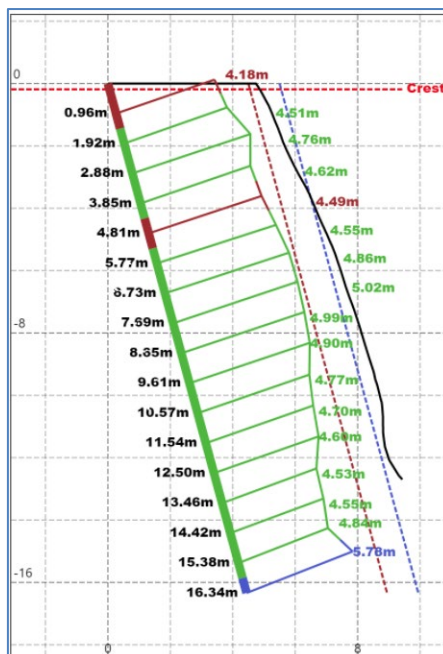
Comments:

Collar 1

Collar 2

The available sections of a report are outlined below.

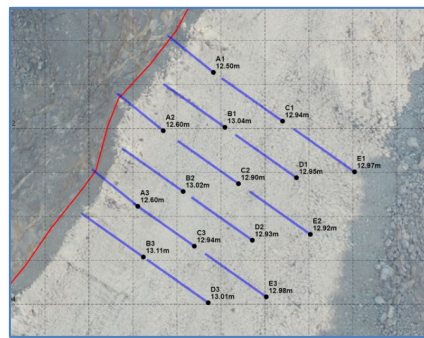
- Burden Report:** display burden distances down the hole, with one hole per page.



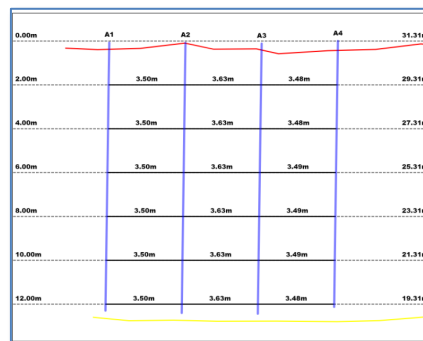
- **Driller's Log:** list all design and actual hole parameters in a table. This print-out allow drillers to reference/amend hole information while on the bench.

Drillers Log								28/0
Label	Diameter	Planned Length (m)	Actual Length (m)	Planned Angle (deg)	Actual Angle (deg)	Planned Azimuth (deg)	Actual Azimuth (deg)	Comments
A1	0.890	13.06	12.50	15.00	12.12	304.20	307.95	
A2	0.890	13.13	12.60	15.00	12.10	304.20	307.90	
A3	0.890	13.11	12.60	15.00	12.12	304.20	308.01	
A4	0.890	13.20	12.40	15.00	12.11	304.20	307.96	
A5	0.890	13.16	12.60	15.00	12.12	304.20	307.96	

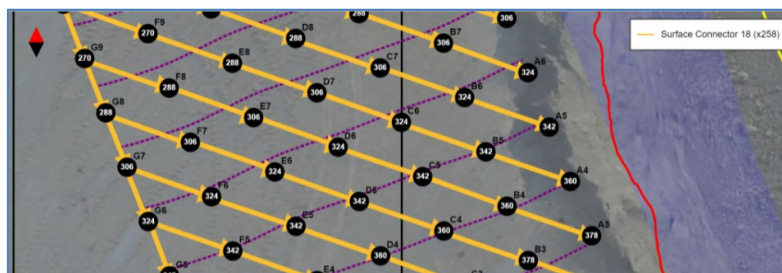
- **Plan View:** overhead view of the blast pattern. The number of columns shown can be defined per page of report and supporting attributes such as hole labels, length, projection lines can be enabled.



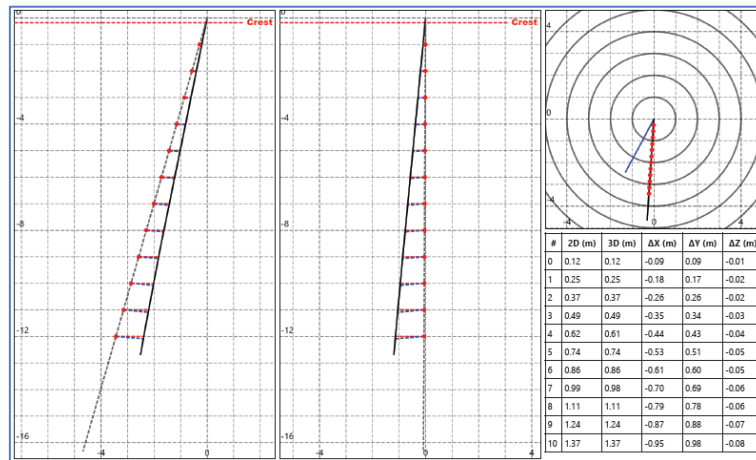
- **Front Facing:** front facing view of the front row. Display distances between holes and hole depth.



- **Tie Up:** display blast timing design with attributes such as connectors, initiation points, contours and delays.



- **Deviation:** display borehole deviation, comparing imported Boretrak data with the design parameters.



21.2 Export

Click **Export** to generate a deliverable report or file to export from the **BlastOPS** project.

- **Reports:** select a template to generate a PDF report configured as per the **Report Template Editor** in section 21.1.2.
- **Save CSV, DRL, CRD:** save and export a file for export to another software package.

21.3 Create Quickload Report

- **Hole Template (PDF):**
- **Hole by Hole (PDF):**
- **Hole by Hole (CSV):**

21.4 Export Scene as PDF

Click **Export Scene as PDF** to generate a PDF document showing the current scene in the **3D View**.