Friday Tips

RealityCapture photogrammetry software by Capturing Reality

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1. Useful shortcuts

Tip #1: Adding control points

When adding control points via 2D, hold the SPACE bar when moving the image inside view to prevent accidental CP placement.

Holding the space bar during any action will switch to camera tool to move/pan/rotate the view

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Tip #2: Using selection tools

When using selection tools in 3D view (Lasso, Rect, ...), you can modify your selections using CTRL key for adding to selection, SHIFT to substract from current selection or CTRL + SHIFT for intersection of selections.

Tip #3: Navigating among images

How to navigate among images in the selected 2D view:

- use the ⬅️➡️ arrow keys to navigate among all images (or the image selection).
- use the SHIFT + ⬅️➡️ arrow keys to navigate among aligned cameras in the selected component.
- use the ⬆️⬇️ arrow keys to navigate among images of the currently selected control point.

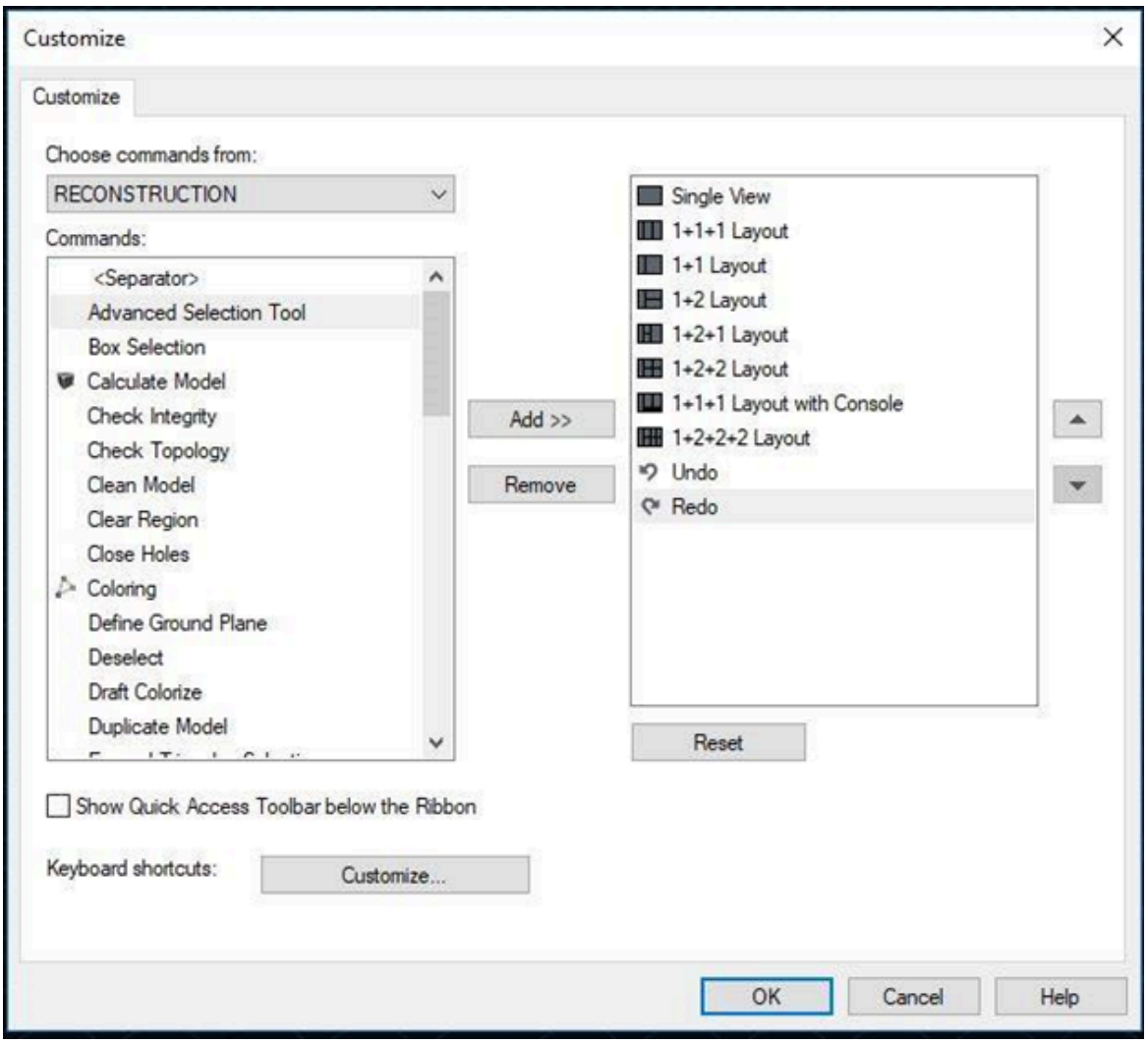
Tip #4: Using the right mouse button

Use the RIGHT 🐁 button to:

⬅️END cancel the tool, e.g. adding control points or lasso selection;
⬅️BACK return to the previous step, e.g. when placing reconstruction region manually to place the previous side.

Tip #5: Customizing quick access toolbar

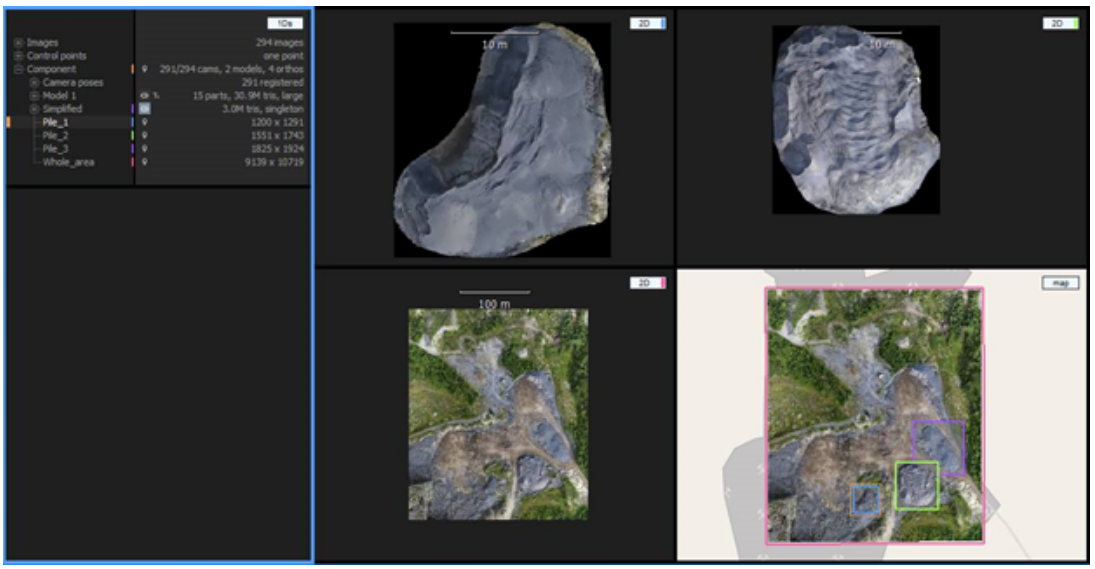
Customize your quick access toolbar and group your most frequently used processes or tools. You can find it in the upper-left corner next to the undo/redo buttons.



Tip #6: Using color cursors

Use color cursors in RC for a better orientation in a project.

- You can use four colors to pair the selectable objects with the specific views (e.g. images or created textures with 2D views)
- To assign color to an object, hold 1/2/3/4 and click on any pickable object in 1Ds/2Ds or an image in 3D view.
- To assign a color to a view, select the specific view and press CTRL + 1/2/3/4.



Tip #7: Using camera selections

RealityCapture offers several camera selection tools available in the Alignment tab and allows you to remember this selection.

Use the Point Lasso or the Point Rect tool to select a part of a sparse point cloud, and find the cameras that see these points with the Find Images tool.

If you wish to select a specific group of cameras in a 3D view, use the Camera Lasso and the Camera Rect tool.

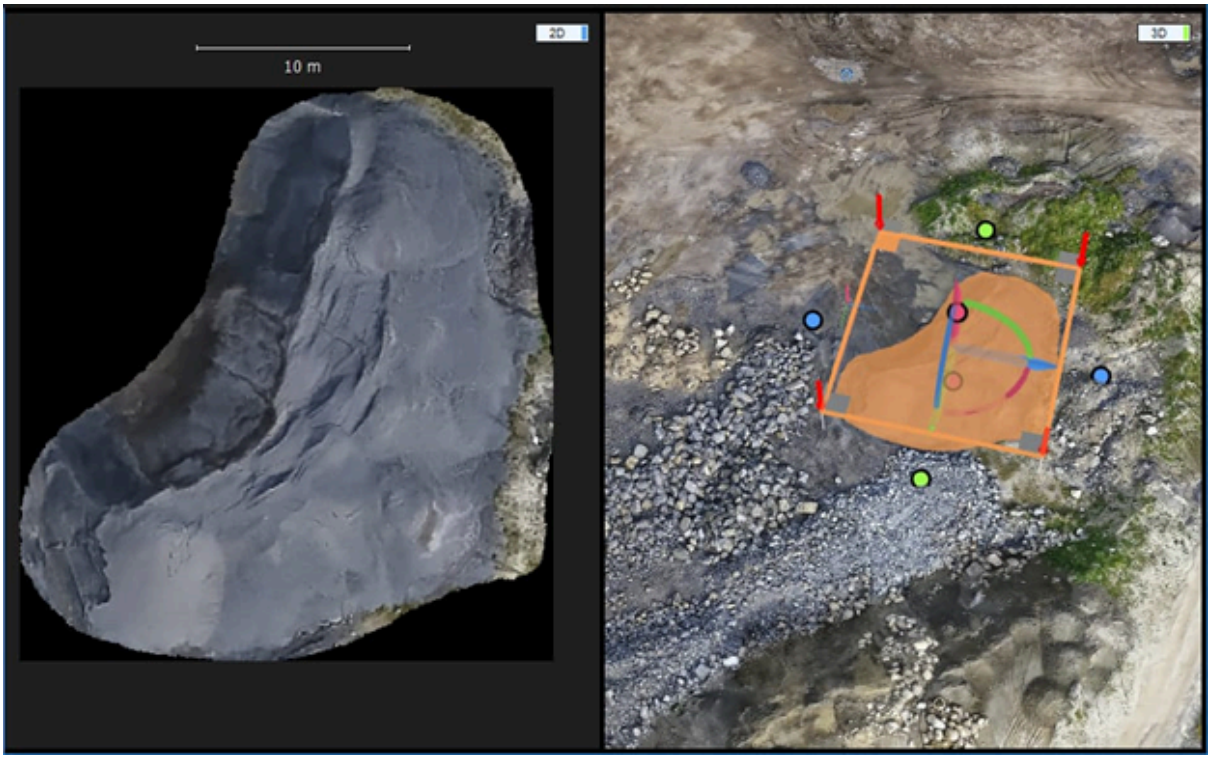
With predefined shortcuts, you can remember 5 camera selections and re-use them, when needed:

- CTRL + SHIFT + F1/F2/F3/F4/F5 to REMEMBER an Image Selection
- CTRL + SHIFT + 1/2/3/4/5 to SET an Image Selection

Link to video: https://youtu.be/feOtZugQv58

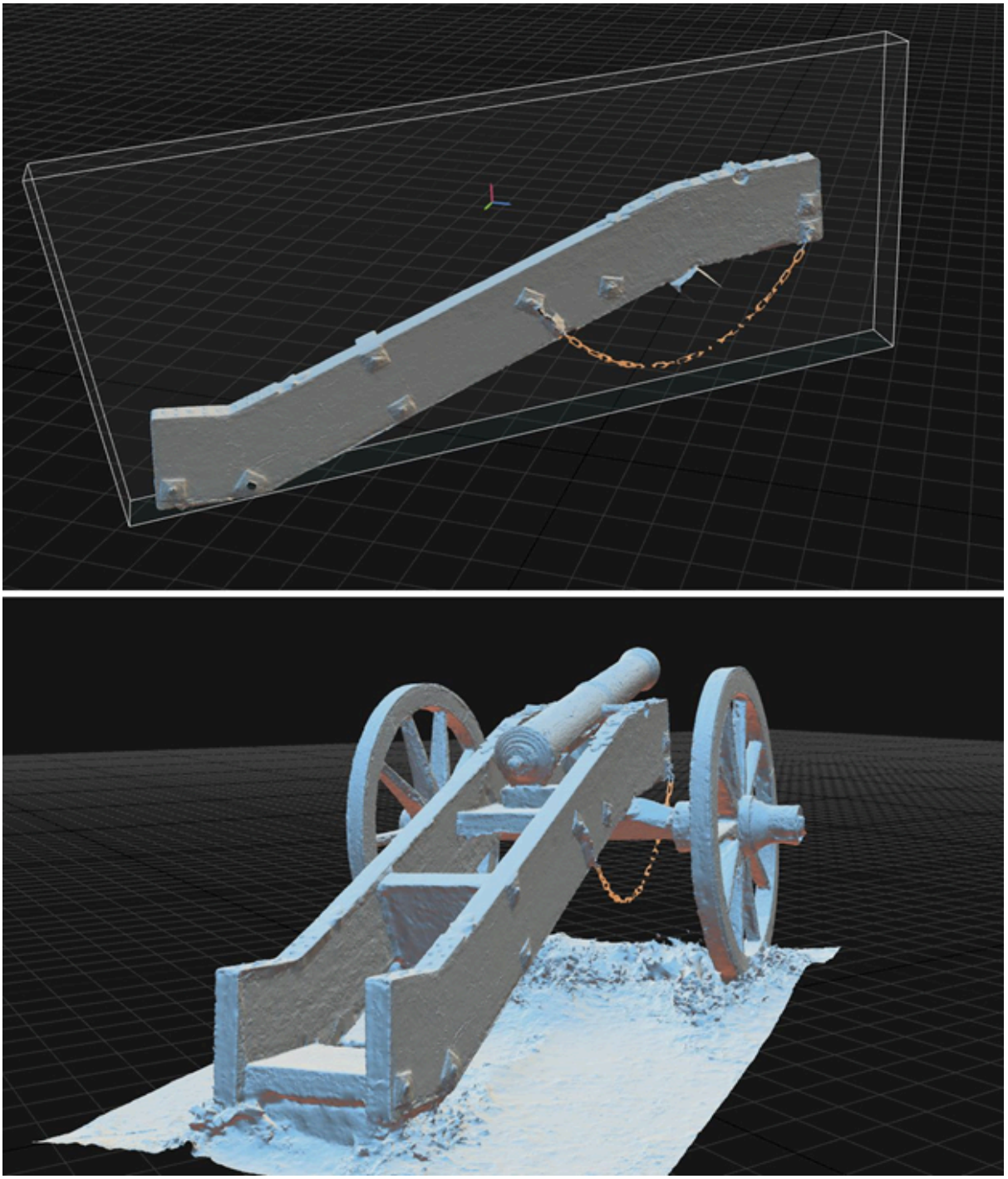
2. Creating ortho-projections

When creating ortho-projection, you can select specific area with Lasso tool and place reconstruction region automatically. RC fits the region and creates ortho just from the selection.



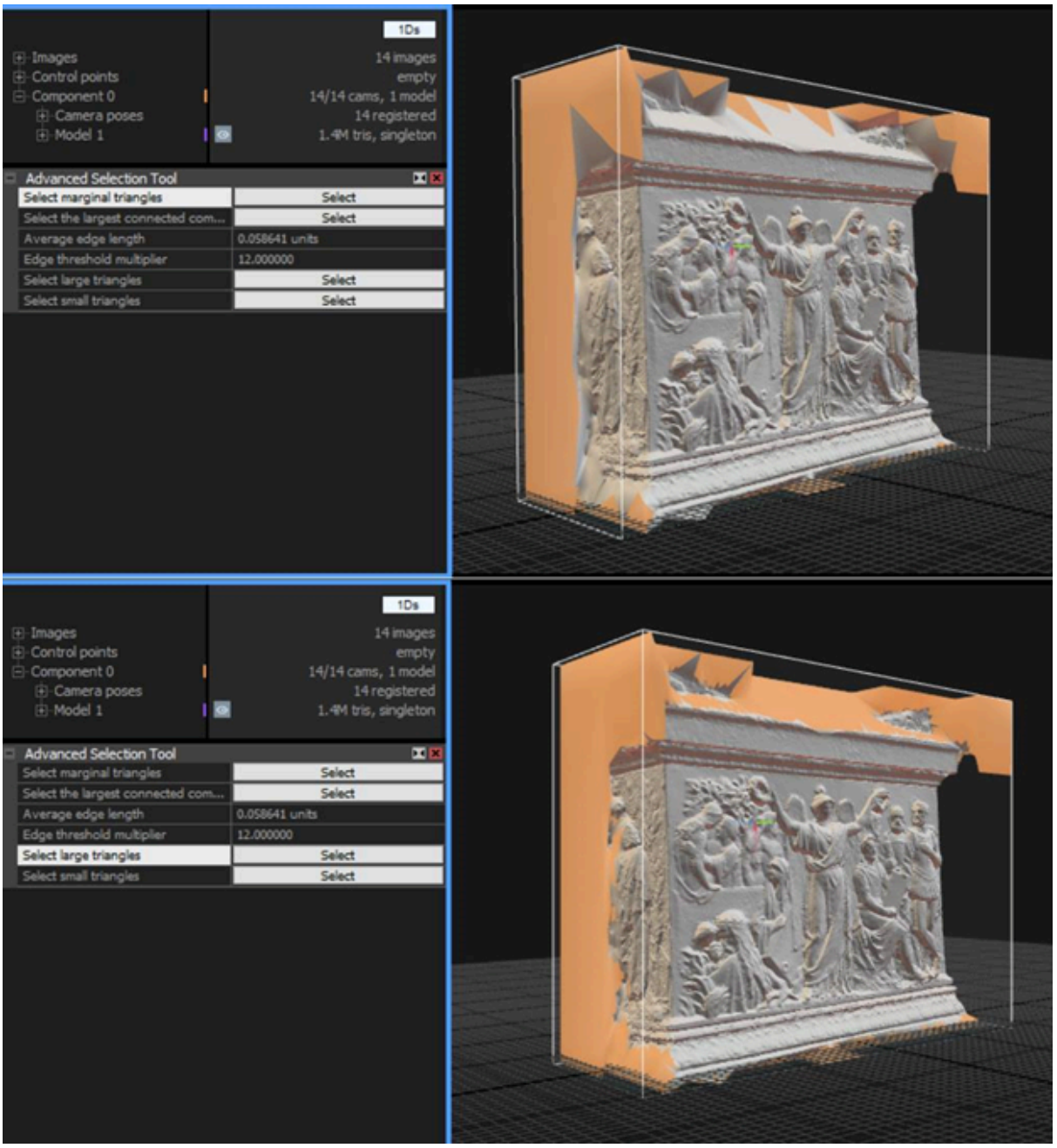
3. Filtering selected parts

Model selection tools respect clipping box and allow you to select and filter hidden or interior parts faster and more comfortable.



4. Using Advanced selection tools

RC creates watertight meshes during reconstruction and encloses volume also in the areas that are not covered with images. If you wish to find and filter those triangles, use Advanced selection tools.



5. Using Ground Control Points (GCPs)

Tip #1: Using suggested measurement tool

Use Suggest measurements tool to significantly speed up the geo-referencing process using ground control points:

1. Align images.
2. Add all ground control points (GCPs) to the project and create measurements for at least 3 GCPs.
3. Update the scene.
4. Select all GCPs and click Suggest measurements. Images are suggested for all GCPs in the scene.

https://www.youtube.com/watch?v=3VSveRYPBrM&list=PL56jeA0rCS3LWuahdfIFWp1d0WDuEKVqe&index=5

Whole tutorial for adding Ground control points:

https://support.capturingreality.com/hc/en-us/articles/360001577032-How-to-geo-reference-the-scene-in-RealityCapture-using-ground-control-points-faster

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Tip #2: Using GPS and GCPs

Be careful when your images contain GPS positions and you use also precise ground control points (GCPs).
In most cases, GPS coordinates from camera priors are less precise than coordinates of the GCPs, and using both sets can lead to larger errors.

https://support.capturingreality.com/hc/en-us/articles/360015467531-When-using-both-GPS-priors-and-GCPs?fbclid=IwAR0nOXVqEeuWaeU6fN68OQ5XB_l9I2oh0SKY8WE7H2n_51VR-qDoei3xLj8

Tip #3: Tips and tricks for RealityCapture Control Point workflow by Vlad Kuzim

https://youtu.be/yk1SUEJdsI8

Tip #4: Custom coordinates export

Do you need to export the actual position of all Ground control points after alignment or export calculated position also for control points of type Tie point? Read more and learn how to do it!

The behavior of „Ground control“ export function is defined by 'controlpoints.xml' located in the installation folder. You can easily edit this file and customize the export to your needs.

For example, export actual coordinates for all control points separated by comma, to three decimal places:

<format mask="*.csv" descID="20336" desc="Comma separated, Name, X, Y, Alt" writer="cvs" specificCoordSystem="1">

<body>#point_name, actualX, actualY, actualAlt

$ExportControlPoints($(name), $(actualx:.3f), $(actualy:.3f), $(actualAlt:.3f)

)</body>

</format>

In a similar way you can customize the “Registration” export by editing 'calibration.xml' file, for example to export also tangential distortion coefficients when using “Brown3 with tangential2” distortion model:

<format mask="*.csv" descID="8370" desc="Internal/External camera parameters" writer="cvs">

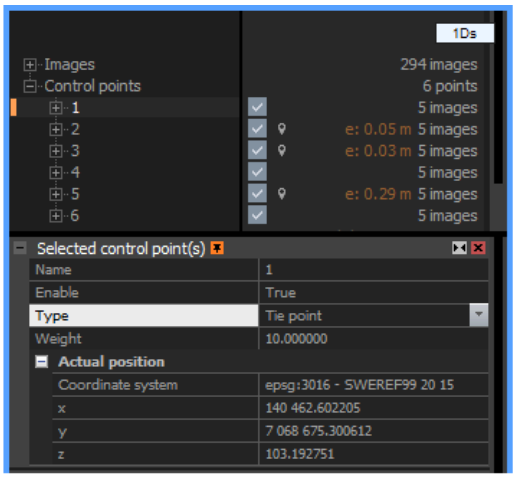
<body EulerFormat="zyx">#name,x,y,alt,heading,pitch,roll,f,px,py,k1,k2,k3,t1,t2

$ExportCameras($(imageName)$(imageExt),$(x),$(y),$(z),$(yaw),$(pitch),$(roll),$(f*35),$(px),$(py),$(k1),$(k2),$(k3),$(t1),$(t2)

)</body>

</format>

All these parameters can be found in the Help – Reports – Functions and Variables Available in the Reports.




```
<format mask="*.csv" descID="20336" desc="Comma separated, Name, X, Y, Alt" writer="cvs" specificCoordSystem="1">
    <body>#point_name, actualX, actualY, actualAlt
$ExportControlPoints($(name), $(actualx:.3f), $(actualy:.3f), $(actualAlt:.3f)
)</body>
</format>
```

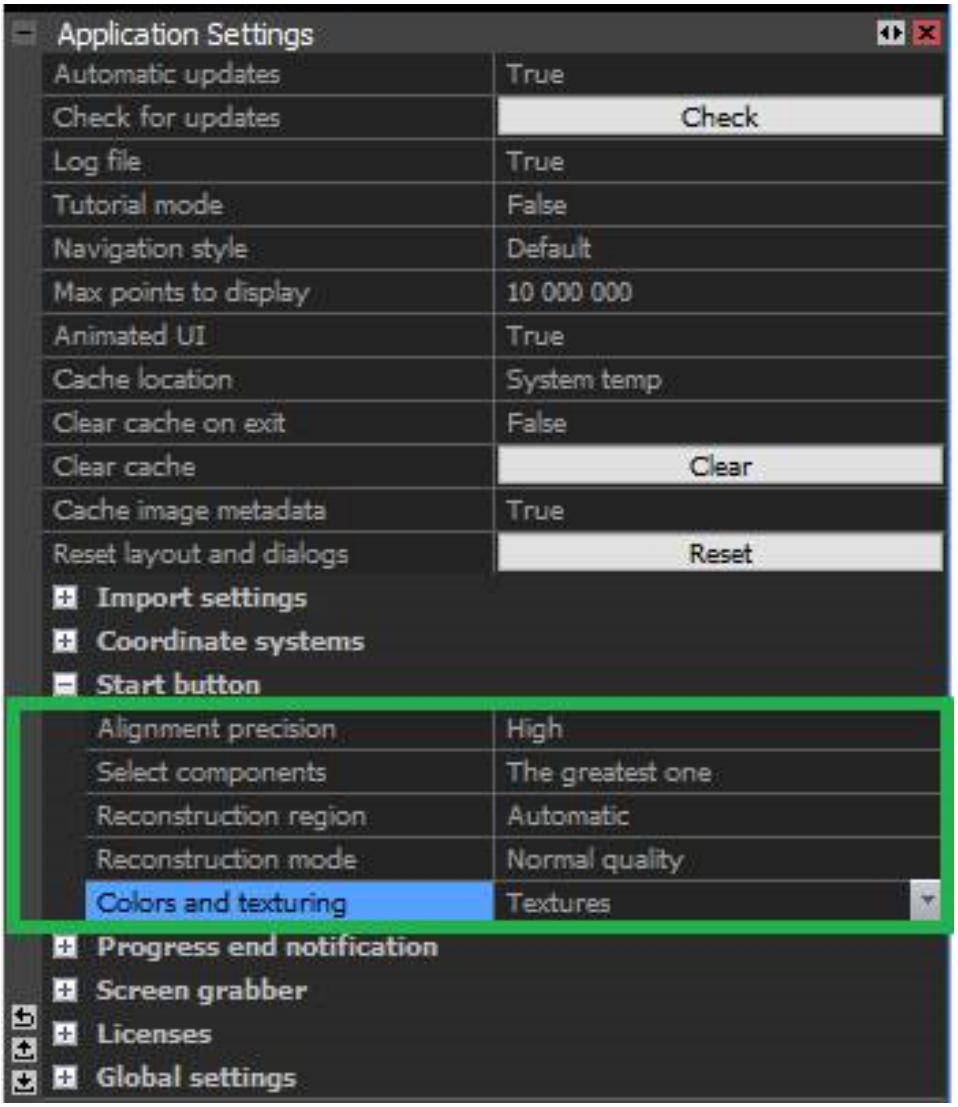
```
#point_name, actualX, actualY, actualAlt
1, 140462.602, 7068675.301, 103.193
2, 140596.573, 7068701.154, 91.891
3, 140717.790, 7068761.114, 83.241
4, 140428.311, 7068776.562, 108.541
5, 140555.613, 7068818.124, 84.906
6, 140680.800, 7068857.988, 84.882
```

6. Using Start button

Get the results you want with customized Start button ⏩ in one click.

- Go to Alignment tab and set your preferences in the alignment settings.
- Go to Reconstruction tab and define the reconstruction and coloring/texturing settings.
- Tell RC what you wish to calculate (picture) and press Start.

RC remembers the settings so you can process your future models with one click.



7. Working with components

What to do when several components are created?

A. The best option is to shoot more images with better overlap or raise the quality of the images.
B. If it is not possible, set Force component rematch to True and align again.
C. Try to change Image overlap to Low and align again.
D. Try to manually place some control points. It is important to identify the same point on the images from different components or on the images that were not registered previously as well.

   You can also change the alignment settings. But do raise these numbers carefully because setting these values too high can lead to detection of false features and weak points.

E. Raising the number of all detected features („Max features per image“) and number of used features from the detected ones („Preselector features“) might help align more images together. Please note that raising the value 'Max features per image' will cause higher memory consumption.
F. If you can see in a "con" view that the number of detected features on images is lower than the number Max features per image, raising this value will not help because RC cannot find more features (might happen for unicolor surfaces or surfaces with weak texture). In such case, you can change the Detector sensitivity to High for surfaces with weak texture to help RC detect more points. Again, changing it to Ultra can lead to finding points which might have texture due to noise in the images.

Whole tutorial:

https://support.capturingreality.com/hc/en-us/articles/115001569011-Working-with-Components-Merging-components

Component workflow in RealityCapture by CyArk - Part 1

https://youtu.be/kKA-KxT25KA

Component workflow in RealityCapture by CyArk - Part 2

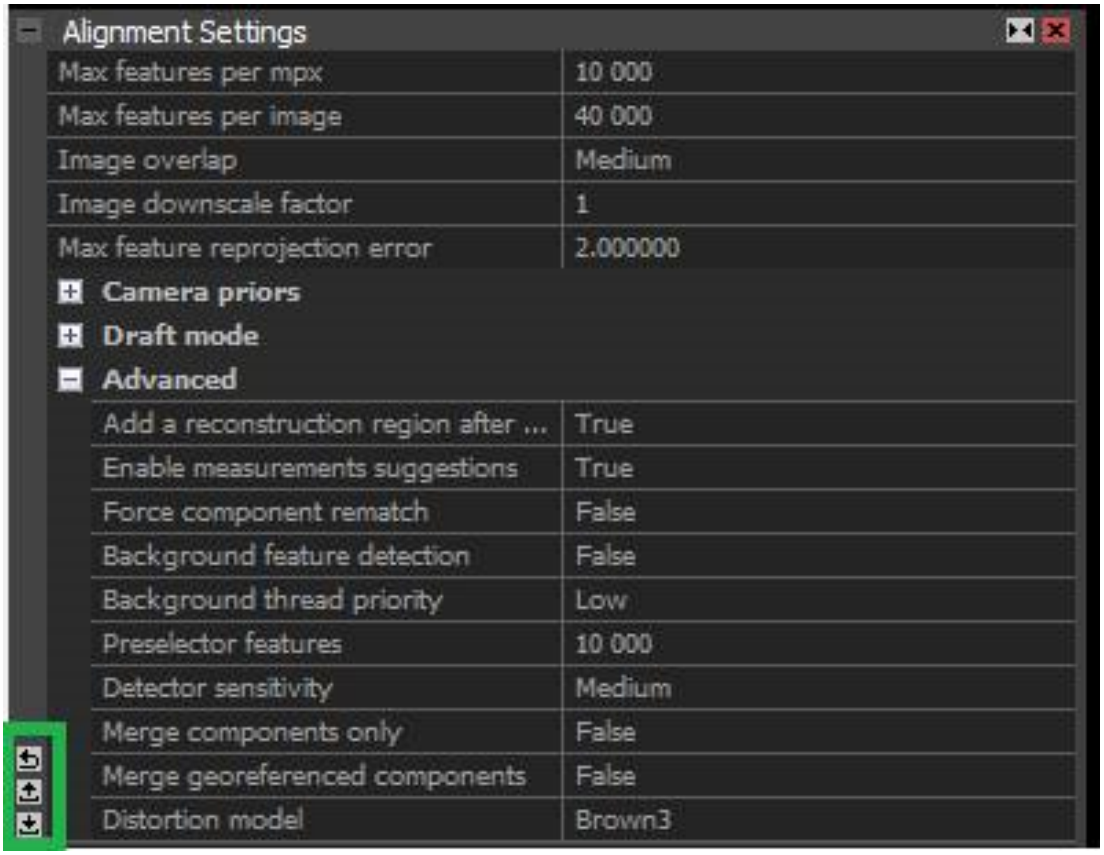
https://youtu.be/ziHvqz6gTVo

8. How to reset settings

Have you played around with setting in RC but now want to change everything back to default? You can do that easily. Here are the options:

A. **Reset all RC settings** –> Launch the application along with holding SHIFT key and select ‘Reset the application settings’.
B. **Reset individual settings panels** –> Open the respective settings panel and click the first small icon in the lower-left corner of the panel. You can also save the current settings and reload them when needed with the other two icons there (see image).

In order to export or import the settings globally, go to Application settings – Global settings.



9. Exporting reports from RealityCapture

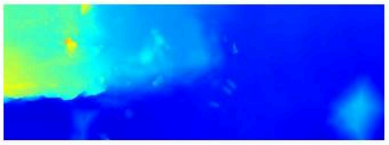
If you need to keep the statistics of each project in one place or share the project parameters with customer, you can export Reports from RC easily in HTML format. There are several predefined report templates and many other functions and variables available. You can easily create custom report perfectly fitted to your needs.
Search for „Reports“ in the application Help.

Selected Ortho Projection Report

Project: ***projekt_gravel_pit***

Fri, Jan 11, 2019 16:34:13
RealityCapture **1.0.3.6310**

Ortho projection name	Ortho projection 3
Component name	Georeferenced
Geo-referenced	true
Width [pixels]	4999
Height [pixels]	6793
Units per column pixel	0.029272
Units per row pixel	0.029268
Bounding box depth (length in the x direction)	146.329131 m
Bounding box width (length in the y direction)	198.820776 m
Bounding box height (length in the z direction)	30.599077 m
Cut Volume	168496.17 m^3
Fill Volume	721731.07 m^3
Area 2D	29083.17 m^2
Area 3D	37453.67 m^2
Coordinate system	epsg:3016 - SWEREF99 20 15
Ortho projection type	Top
Projection	Transverse Mercator
Bounding box centre in epsg:4323 - GPS (WGS 84) Coordinate system	lat: 63° 43' 16.4019'' N lon: 20° 3' 34.8814'' E alt: 96.958778 m
Corners in epsg:4323 - GPS (WGS 84) Coordinate system	NW: lat: 63° 43' 19.6123'' N , lon: 20° 3' 29.5515'' E NE: lat: 63° 43' 19.6123'' N , lon: 20° 3' 40.2113'' E SE: lat: 63° 43' 13.1915'' N , lon: 20° 3' 40.2109'' E SW: lat: 63° 43' 13.1915'' N , lon: 20° 3' 29.5517'' E
Prime meridian	greenwich
Units	Meter



Selected Component's Tie Points Stats

Project: *projekt_gravel_pit*

Fri, Jan 11, 2019 16:22:55

RealityCapture **1.0.3.6310 RC**

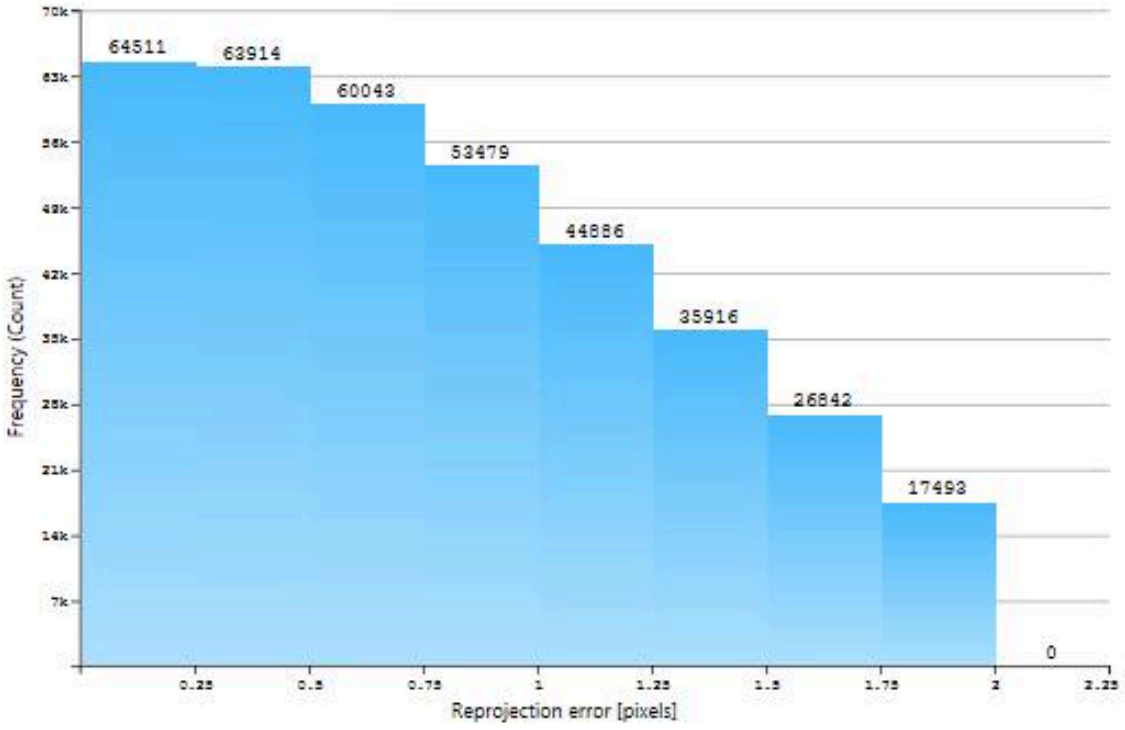
Component name	Georeferenced
Points' count	367085

Reprojection Errors

Histogram values

Number of values (total sum)	367084
Max frequency (max count)	64511
Range of values (interval)	[0, 2.25)
Bin size (step size)	0.25

Bin index	Upper bound value [pixels]	Frequency (Count)	Cumulative sum
0	0.25	64511	64511
1	0.5	63914	128425
2	0.75	60043	188468
3	1	53479	241947
4	1.25	44886	286833
5	1.5	35916	322749
6	1.75	26842	349591
7	2	17493	367084
8	2.25	0	367084



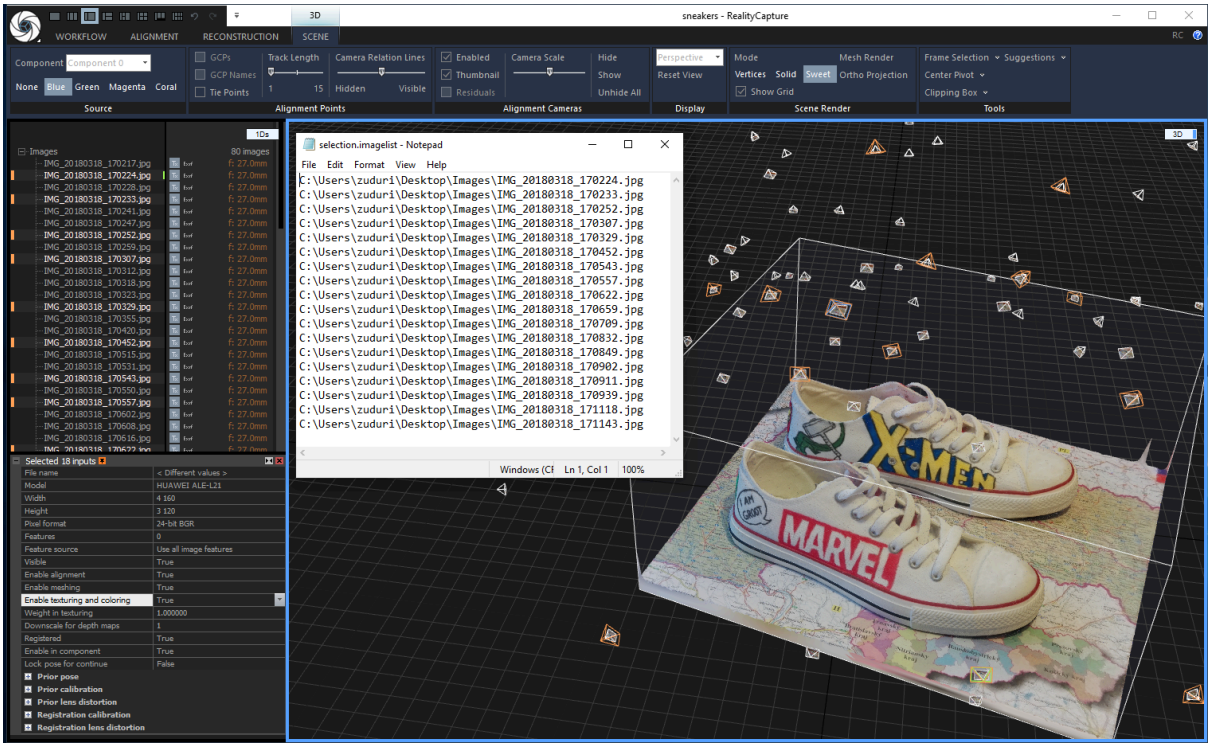
10. Using image selection

Do you need to select certain images and use it across multiple projects? Or do you need to reuse the same selection over and over again?

You can easily save the list of the selected images to a text file via ALIGNMENT tab ➡️ Export ➡️ Image List.

Then simply drag and drop the file into a clear project to load only the selection.

In order to select the images in an existing project, import the file via WORKFLOW tab ➡️ Import&Metadata ➡️ Image Selection. Then set the preferences for the selection, e.g. set the same calibration group or enable/disable them for individual processes.

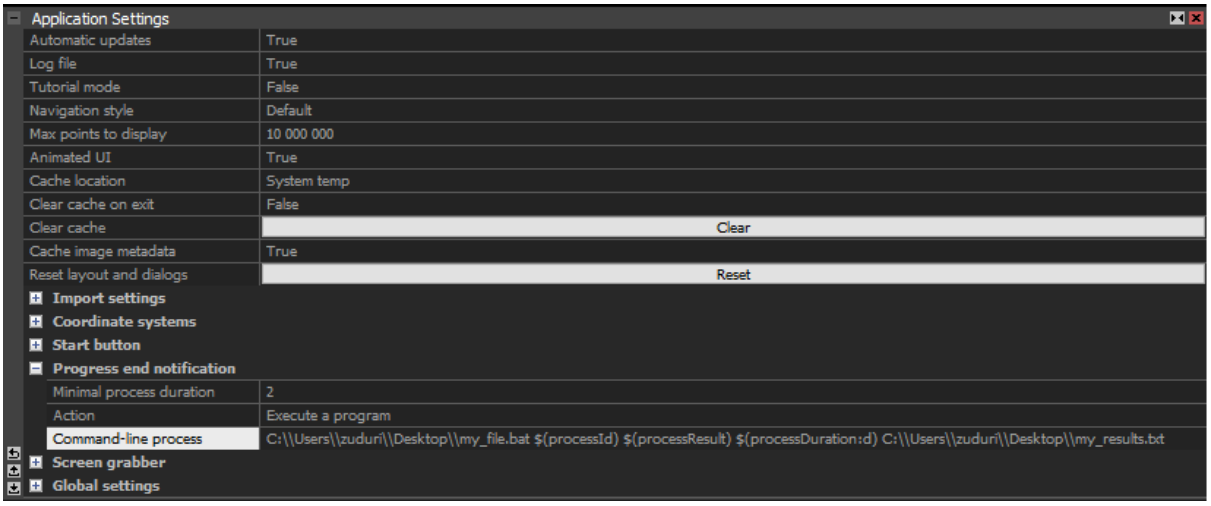


11. How to set Progress end notification

You don't have to check the progress bar every time, to know that the computation is done. You can tell RC to notify you by playing a sound or writing the process result into a file. You can define it in the Application settings, section "Progress end notification".

A very simple example is to write executed file 'my_file.bat' like this:
echo Process %1 has finished with result code %2 in %3 seconds. > %4
And then in the "Command-line process" call the 'my_file.bat' file with parameters:
C:\\Users\\zuduri\\Desktop\\my_file.bat $(processId) $(processResult) $(processDuration:d) C:\\Users\\zuduri\\Desktop\\my_results.txt
Note: Use your own paths for the files.

Results will be written into the file 'my_results.txt'. If the process finishes correctly, processResult will be 0. You can also adjust executed file to write result only for the processes finished with an error.
You can find more info in the Help, section "Application settings".



E-mail notification

Simple example: How to send an email from Gmail after process is finished either with „success" or „error".

Create file ‚my_file.bat' like this (in the first line enter the path to your files):

```
cd C:\Users\user\Desktop\
if /i "%1"  NEQ "0" (
PowerShell.exe -ExecutionPolicy Bypass -file ".\email.ps1"
-argument "ERROR"
) else (
PowerShell.exe -ExecutionPolicy Bypass -file ".\email.ps1"
-argument "SUCCESS"
)
```

Create file ‚email.ps1‘ like this (change your credentials):

```
param($argument="none")
$EmailFrom = "emailFrom@gmail.com"
$EmailTo = "emailTo@gmail.com"
$Subject = "RealityCapture process"
$Body = ("Computation finished with result:",$argument)
$SMTPServer = "smtp.gmail.com"
$SMTPClient = New-Object Net.Mail.SmtpClient($SmtpServer, 587)
$SMTPClient.EnableSsl = $true
$SMTPClient.Credentials = New-Object
System.Net.NetworkCredential("username", "password");
$SMTPClient.Send($EmailFrom, $EmailTo, $Subject, $Body)
```

In the Application settings, section Progress end notification - Command line process call the ‘my_file.bat’ like this (change to your path):

```
C:\Users\user\Desktop\my_file.bat $(processResult)
```

NOTE: You might need to change your Gmail settings allowing less secure apps to access your account.

Alternatively, you can add more parameters to the message such as process ID or process duration.