



Autodesk ReCap Photo




Getting Started Guide

Autodesk® ReCap™ Photo is an online service that creates high resolution textured 3D models from photos. In the technology world this process of generating 3D models from photographs is known as ‘image based modeling’ or ‘photogrammetry’.

Autodesk® ReCap™ Photo generates mesh models (**.OBJ**, **.RCM**, **.FBX**, **.IPM**) that can be post processed in applications such as Project Memento (software for cleanup/fix and editing huge meshes) or used downstream in modeling applications such as Autodesk 3ds Max®, Maya® or Mudbox®. Autodesk® ReCap™ Photo also generates a point cloud format (**.RCS**) that can further be used in a workflow with Autodesk® ReCap™ Pro (Autodesk’s laser scans registration, visualization and clean up solution), AutoCAD®, Revit®, Inventor®, Navisworks®, Infraworks® etc..

Autodesk® ReCap™ Photo is a full cloud solution that requires no download, it can be run from any OS, Mac or Windows and as it leverages the cloud for powerful computations, it can be used from a very modest computer.

Photo-to3D process

			
Shoot Photos, go to recap.autodesk.com to start ReCap Photo	1 Start a new project, name it, select the mesh quality, the export file type, upload the photos and submit to get a 3D model	2 View the model online and download the 3D models to use them further in various workflows	3

Being successful:

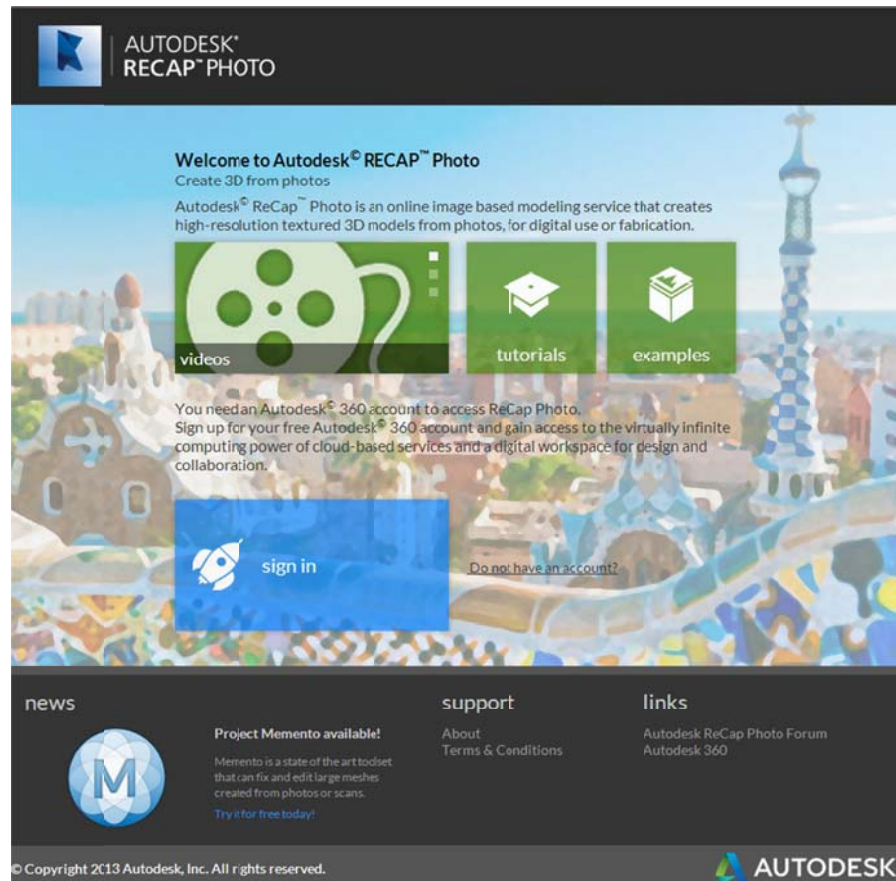
One of the most fundamental factors for getting a good 3D model reconstruction from photos is to take GOOD photos and ENOUGH photos that have GOOD overlap. Please refer to the end of the document for tips on good shooting strategies.

Table of Contents

1. GETTING STARTED	3
2. BASIC WORKFLOW: From photos to a 3D model	5
STEP 1 - Create a new project	5
STEP 2- Project settings	5
STEP 3 - Upload photos	6
STEP 4 – Viewing the results online	8
3. FOLLOW UP WORKFLOW: Resubmit	12
B1. Resubmit to get different mesh quality or different export format	12
B2. Resubmit to add more images	13
B2. Resubmit to manually stitch unstitched images	13
4. ADVANCED FEATURES AND WORKFLOWS	15
ADDING SURVEY POINTS	16
INPUT KNOWN DISTANCES	18
5. WHAT NEXT?	21
6. 3D PRINTING	21
7. MANAGING MY PROJECTS and STORAGE	22
8. NOTES for existing users of ReCap Photo on A360	23
9. KNOWN ISSUES, LIMITATIONS and BUGS	24
10. ADDENDUM - How to take photos that are good for photogrammetry	25

1. GETTING STARTED

To start, go to <http://recap.autodesk.com/photo>



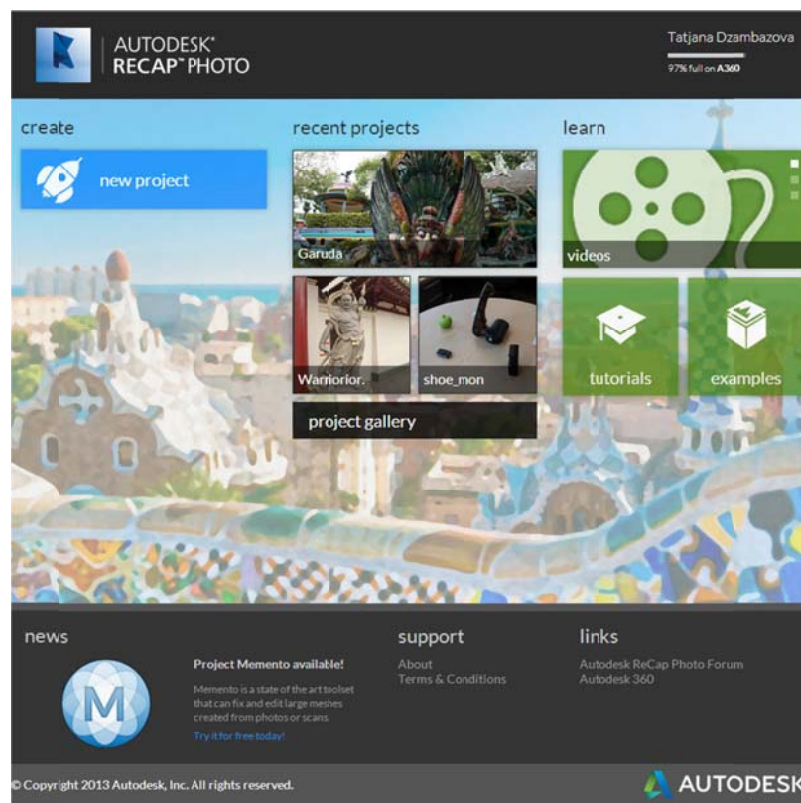
To start using ReCap Photo, you will first need an account on Autodesk 360 <https://360.autodesk.com>. A360 is Autodesk's cloud platform that gives you access to many cloud based services, storage, online viewing as well as collaborative exchange and sharing. If you already have an A360 account, use the Sign in button. If don't yet have an A360 account, sign up for a free account using the link next to it.

Know that all your projects (photos and reconstructions will be hosted on A360 but can be accessed via this web site, using the Autodesk 360 link in the ribbon at the bottom of the page)

VERY IMPORTANT:

To run A360 or ReCap Photo, you must use **Google Chrome** or any other WebGL enabled internet browser. (we use WebGL tech for previewing the 3D model in a browser and Internet Explorer currently do not support WebGL. Chrome is our recommendation.)

Once signed in, you will arrive on the landing page of ReCap Photo.



The Landing page contains:

- Learning and informational material (getting Started guide, videos and example projects)
- Gallery of projects you have already done, and the last 3 projects exposed
- Possibility to start a New project
- Information about the usage of your storage (top right)
- Links to forums
- Link to your A360 account where you can manage and share your project files

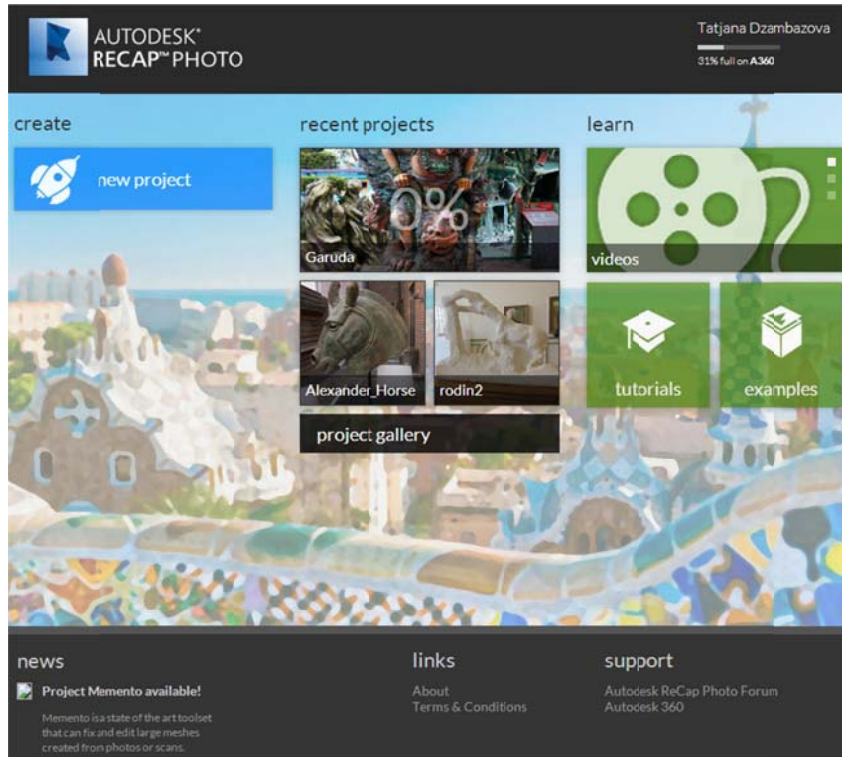
If you are new to the ReCap Photo service, we recommend you to look at the Videos to see how to take photos and how this photo-to-3D service works. You should also read the Getting started guide (which obviously you are – since this is it 😊!). Also, open some of the example files to see and experience how models/scenes generated from photos look like.

So, let's start making 3D models from photos!

2. BASIC WORKFLOW: From photos to a 3D model

STEP 1 - Create a new project

To start a new project, select 'New Project' from the landing page.



Change image

This will open a new dialog where you will be prompted to input all project settings.

STEP 2- Project settings

The image shows a 'first, we need a project name!' dialog box. It has a text input field for 'project name'. Below it, it says 'next, choose what quality mesh you need' with three buttons: 'preview', 'high' (selected), and 'ultra'. At the bottom, it says 'finally, choose which export formats to create with your project.' with five radio button options: 'obj' (selected), 'rcm' (selected), 'fbx', 'ipm', and 'rcs'.

- You will start by giving a **Project Name** (this btw, will become the name of the project folder on your Autodesk 360 account where the projects are stored and can be managed)
- Next you select the **quality** for the 3D model you wish to create
- Finally, you set which **export formats** you wish the 3D model generated from the photos to be published in

Few details here:

QUALITY OF MESH

There are 3 choices for mesh densities/qualities for the generated 3D models:

- **Preview** – you can use this mode to get a quick result and see if your stitching (3D model creation) will be successful. In Preview mode, you can only view the 3D model, but you cannot export the mesh. (The export options are not available in this mode). This selection will give you the results in shortest amount of time, but it will also by no means give you the high quality results you are aiming. It is more a mode in which you can see if you took the photos well and if they stitch well at all, without having to wait too much.
- **High and Ultra** – These mesh densities give you a high quality mesh model that can be exported in various formats. Given that they deliver high quality results, they will take some time to get processed, sometimes up to few hours, depending on the size of the scene.

Selecting which will depend on the time you are willing to wait for the 3D model to be calculated and the final quality of the 3D reconstruction you will need.

EXPORT FILE FORMATS

ReCap Photo can export the 3D models that it generates from photos, in .OBJ, .FBX, .IPM .RCM and .RCS format. The first four are MESH file formats, while .RCS is a point cloud file format, appropriate to be opened in [ReCap Pro](#), Autodesk's solution for visualizing, cleaning and registering point clouds (scans).

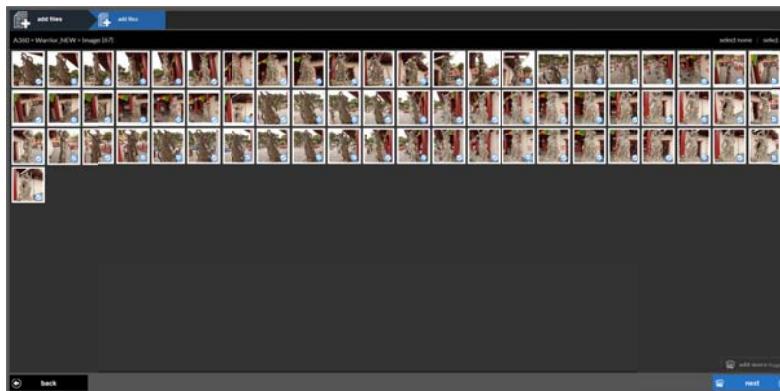
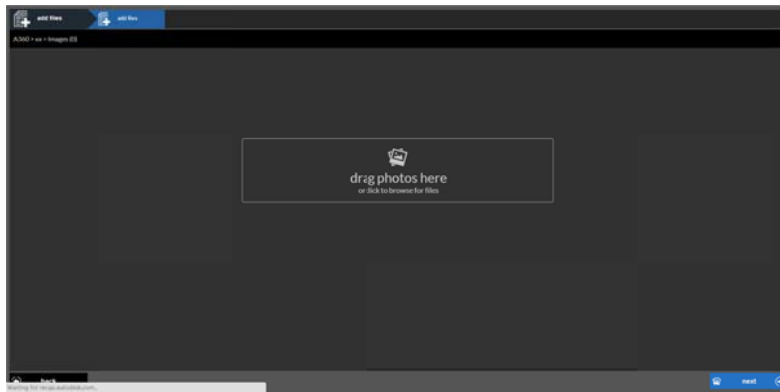
The native file format in which ReCap Photo saves the 3D scene is .RCP. This is the Reality Capture Project file and it is that file that you need to select when wanting to open/view your model online. Do not confuse it with RCS which is the point cloud format that can be opened and used in ReCap Pro.

After making all the choices about the project you are about to create, click on Next to open the new page where you can upload the photos.

STEP 3 - Upload photos

The service now guides you to the next step – prompting you to upload photos. You can upload photos from your Desktop (by browsing or drag&drop) or from your A360 account, if you have stored images there).

To upload from the Desktop, click anywhere in the main window – this will open Finder/Explorer and you browser to the folder with your photos



Be aware – if you are uploading lots of photos it might take a few minutes, as the system is uploading the photos to ‘the cloud’

After all your photos have a blue sign indicating that the upload has been done, click ‘next’.

In the next page you can choose to:

- Immediately click ‘next’ again, which means that you are submitting the scene as is, with all the uploaded photos

OR

- You can delete first unwanted photos (if you notice now that they are blurry or a wrong photo entered the set)

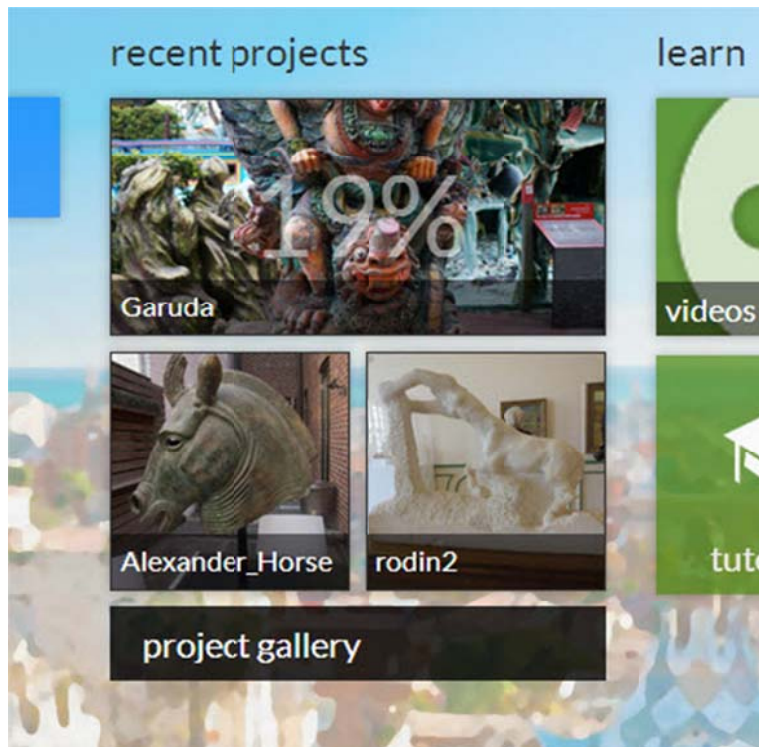
AND / OR

- you can insert Survey points or set a known Distance you might have as additional information for the reconstruction. These settings are available under the ‘advanced tools’ (bottom left on the screen), that when activated, displays a new button in the ribbon, called REGISTRATION. More about this later on in the document

Doing any of the above and ending by clicking Next, will send your scene for computation: Your scene will be submitted.

When the scene has been fully calculated, you will receive an email notification with a link to open the created 3D scene. Note that the email will be sent to the email address with which you logged in / registered on A360.

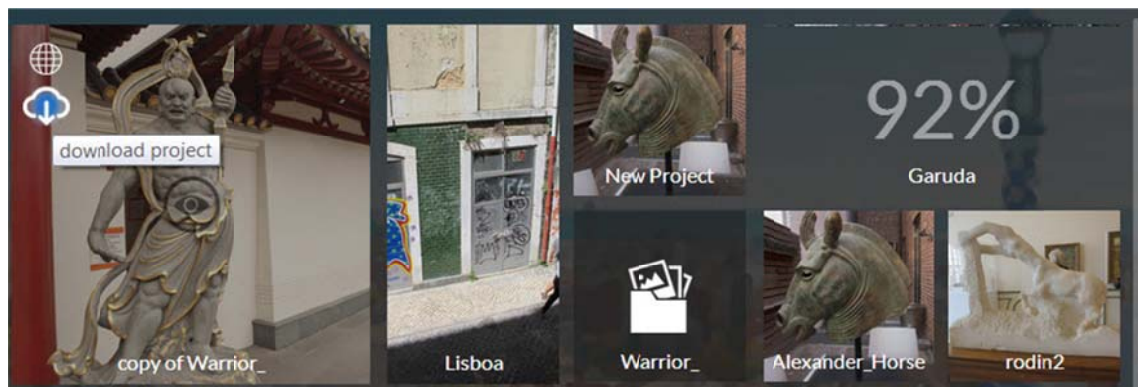
You will also notice that on the landing page, the progress of the calculation will be displayed over the project thumbnail in percentage:



Depending on the size and number of uploaded photos as well as the quality you selected, this might take a while, so best is not to wait and do nothing but get yourself busy with something else until you Receive the email notification.

STEP 4 – Viewing the results online

When the project is fully processed at 100%, an email will be sent to you informing you that the project is ready for viewing. In the email there will be a link that opens the scene in the 3D online viewer.. (Alternatively, just come back to your landing page, refresh it and open the 3D scene from there, by clicking on the thumbnail.) The file that will be opened for viewing in the browser is the .RCP (Reality Capture Project) file.



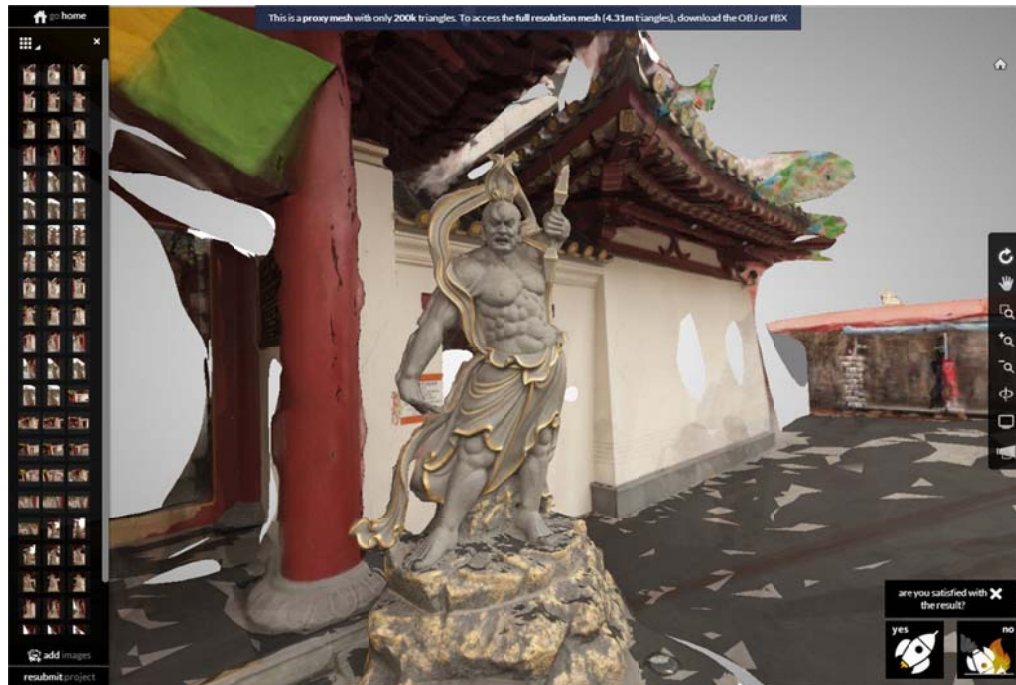
Important note: the web browser viewer does not display the scene in the visual or detail quality that it was actually processed. This web viewer we are using is limited to what it can display in mesh quality and texture and just shows a proxy preview. To view the actual, high quality results of your scene, make sure you export the scene as RCP or OBJ and then open in Project Memento (see link at the end

of doc), Maya, 3dsMax, Mudbox or any other modeling application. The following message pops up when opening the Web 3D viewer, informing you of that limitation:

This is a proxy mesh with only 200k triangles. To access the full resolution mesh (4.31m triangles), download the OBJ, RCM, or FBX

VIEWING

Here how the web viewer will show you the scene.



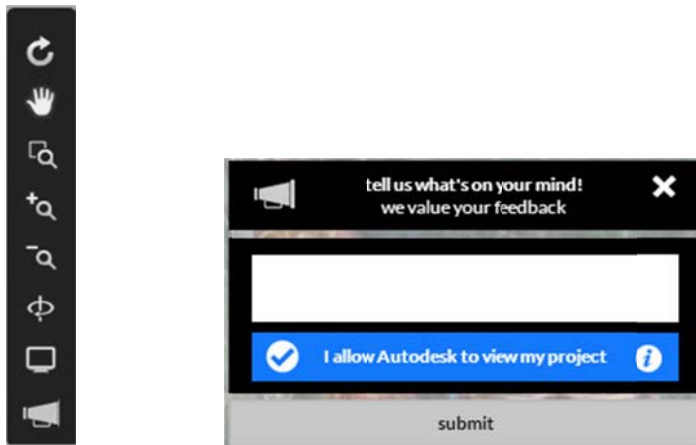
INITIAL FEEDBACK

The first time you open a generated scene, we will ask you if you got what you expected. A little dialog box: 'Are you satisfied with the result?' will pop up in the lower right corner of the screen. Please take time to click 'Yes' or 'No'. if you have more time and the answer was no, maybe you could also elaborate in the feedback field.



FEEDBACK

Also, if you wish to give feedback on the service at any point, while working on your project, you can use the feedback field. It is the loud speaker icon located in the vertical menu/side bar on the right side of the screen) to send us feedback or link to the forum.



Note that there is a check box with which you will allow us, Autodesk, to take a look at your scene. Note that we will look at your scene ONLY if you do check that box.

NAVIGATION

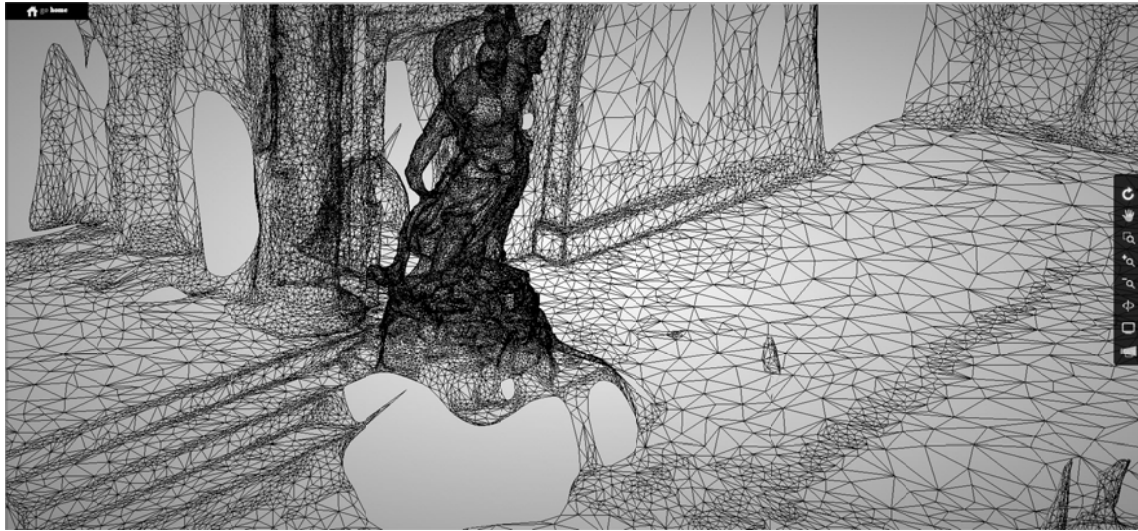
To navigate the 3D scene, you can use either the navigation tools displayed in the side bar on the right, or the mouse:

- ORBIT : left button
- ZOOM : mouse wheel for zoom
- PAN : middle mouse + hold



The side bar in the viewer also gives you the option to change the display of the mesh and view the generated 3D model as a textured model (Default setting) or as mesh only. To switch between the two, click on the monitor icon in the menu on the right side and select the globe icon for mesh only display. To come back to texture display, click again on the globe icon. Don't forget what we mentioned previously in the document, that the viewer does NOT display the actual resolution of the mesh or quality of texture, it is just a proxy viewer.





You can also display the camera positions where the photos were taken, by clicking the camera icon in that same sub-menu. To stop viewing the cameras, click on the camera icon again.

With the steps above you could be:

1. DONE

and that's it, if you are happy with the scene and have exported it in the file formats you need for downstream use.

Or continue to:

2. RESUBMIT

You would resubmit in the following use cases:

- You did Preview or Standard mode to check if all is good and you want now the highest possible quality and exported files
- You are OK with everything, but forgot to check some of the export formats that you need later
- You want to add more images that you have taken additionally, to improve the reconstruction
- The reconstruction failed to take in account some of your photos and you want to manually add them.
- You have survey points or a known distance that you got later as information and you want to add that info to the scene

Let us take a look at those scenarios

3. FOLLOW UP WORKFLOW: Resubmit

B1. Resubmit to get different mesh quality or different export format

If you submitted your project initially in Preview mesh quality in order to save time and have a look at how well you took the photos and if your scene will stitch, you will probably want to then resubmit the scene in a higher resolution, High or Ultra. (Same goes for, if you submitted in High but now want Ultra quality)

To do that, you can either open the link from the email that was sent to you or open the project by clicking on it from the project Gallery. The moment you do that, the web Viewer opens, and there, in the lower left corner there is a RESUBMIT PROJECT button.



resubmit project

Once you do that, a settings dialog appears, similar to the one you saw when you initially started the project, but this one has few more options:

A screenshot of a settings dialog for resubmitting a project. The dialog has a dark background with white text. It contains three sections: 1. A question 'do you want to resubmit (and update) your current project, or create a new version of it?' with two buttons: 'overwrite' (highlighted in blue) and 'new version' (grey). 2. A section 'next, choose what quality mesh you need' with three buttons: 'preview' (grey), 'high' (highlighted in blue), and 'ultra' (grey). 3. A section 'finally, choose which export formats to create with your project.' with five radio buttons: 'obj' (checked, blue), 'rcm' (checked, blue), 'fbx' (unchecked, grey), 'ipm' (unchecked, grey), and 'rds' (unchecked, grey). Below these is a checkbox 'review project before submission' which is unchecked. At the bottom are two large buttons: 'cancel' (grey) and 'next' (blue).

This time, you are given the option to decide whether, when you reprocess the scene, you wish to overwrite the existing scene or create a new scene.

You can also review project before submitting (which will be discussed later)

If you decide that the new reconstruction should be a new file and you don't want to override the existing reconstruction you made, select 'new version', select the mesh quality you wish to make now and the export file formats, and click next. This will restart the computation on the cloud and you will again receive an email about the newly made reconstruction, once it is ready.

Note that, Ultra setting and more export types can mean few hours of calculation, so plan on doing some other work while that is being processed.

B2. Resubmit to add more images

This is a second situation for which you might want to resubmit a project. If you notice that you have lots of gaps in your reconstruction, or see that you didn't get the level of detail you expected in certain areas, it may be that you have not taken enough photos. If you do take additional photos (these are often detailed close ups of a part of the object where lot of detail is required, or reshooting from an angle where the reconstruction didn't do so well) you have two strategies to follow:

- you can start a whole new project and rerun Base scenario with all images
- you can use the ADD IMAGES button on the left lower side of the viewer and add more images.

Note: please note that the current system does care about the order of the images (their naming). So, before you upload more images, try to name them such that they will fit on the right position in the sequence of the existing photos.

B2. Resubmit to manually stitch unstitched images

When there are issues with your photos, after the scene is reconstructed for the first time, you might see that you have a few 'unstitched' photos, displayed in the side bar (usually you need to scroll down to see them – they will be listed under: 'Not stitched images'). Unstitched photos are photos that the service couldn't take into account for the model generation, because they have little similarity with the rest of the photos (for example, the contrast between two photos is too high, or the overlap is too small etc.). Adding those photos might increase the quality of the generated 3D model, but it requires a manual stitching process.

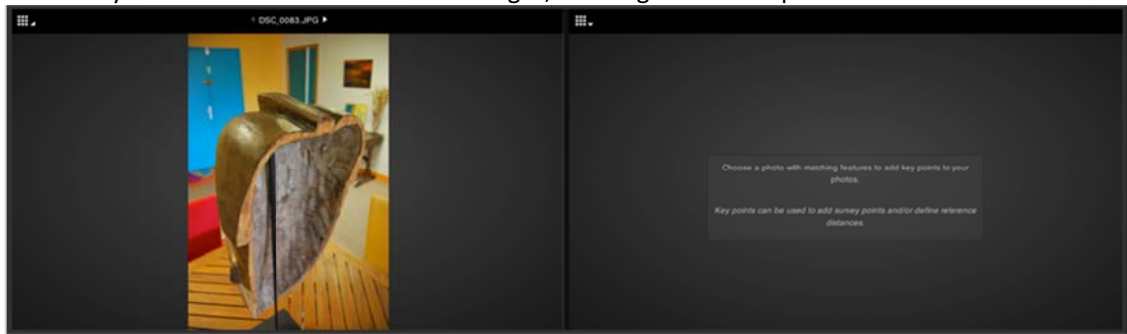
You will be allowed to manually stitch those images, by defining manually matching points between an unstitched photo and stitched photo so that the system takes the unstitched photo in account.

Note that you must add 4 manual points in 4 different images to have a successful manual stitch.

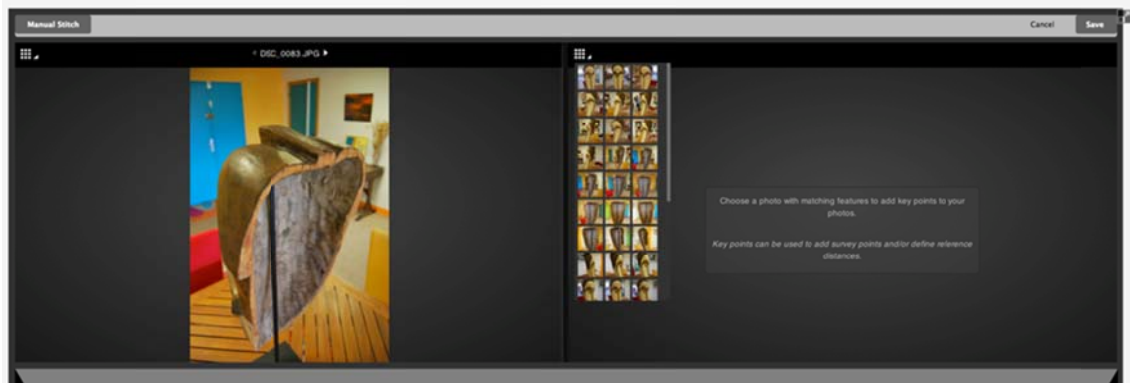
To start a manual stitch, from the left side bar, scroll down to see unstitched images, pick one and select STITCH on the top right of the screen



In the new window, the photo that you selected to be stitched will be displayed on the left side on the screen. On the right side, you will be offered a choice of multiple, already stitched photos to pick from. You should pick an image that has many similar points with the unstitched one. And you have to do it on 4 different images, defining 4 different points.

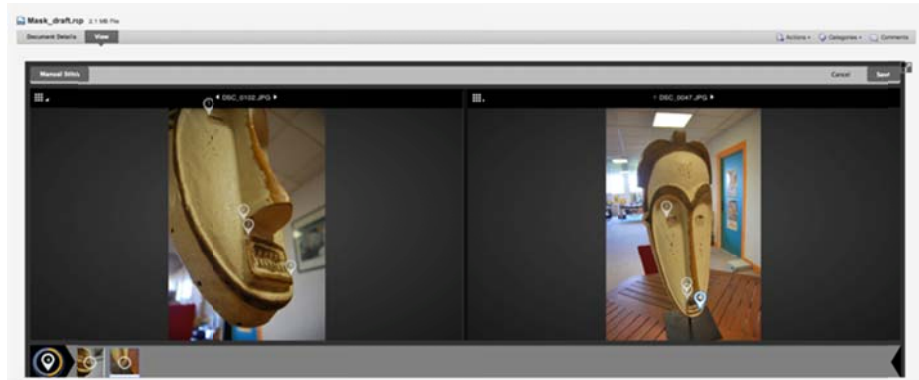


Expand the little icon on the left corner of the right screen to see the photos to choose from.

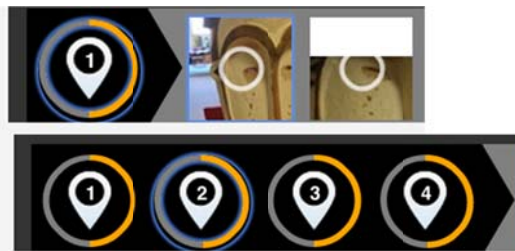


You should now start identifying matching points between the two photos that are common in order to help the system understand where the unstitched photo fits. Defining 4 matching points in total is usually good practice.

When you click on a point you wish to set as common between the two photos, the cursor turns into a magnifying glass that helps more precisely define the point. You can change the magnification factor with your mouse wheel. Start finding a point on the left click. It will be marked as Point 1. Then try to find the same point on the photo on the right side. That will also be marked as Point 1. Continue until you do this with 4 matching points. You should see something like this when you are done.



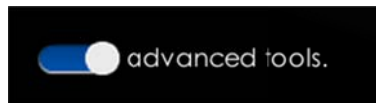
On the bottom left of the screen you will also have a display of all matching points and the corresponding selection. To view all points you have identified, hover over the first icon. Then you can click on any of the other points to see the corresponding matching points.



When done, click on the 'next' and you will be again resubmitting the scene for recalculation.

4. ADVANCED FEATURES AND WORKFLOWS

ReCap Photo has advanced features and those are 'optional' to the straightforward photo-to-3D process. You can see the additional advanced tools by clicking on 'advanced tool' button on the bottom left of the sidebar in the initial settings screen or in the viewer, when a scene has been processed.



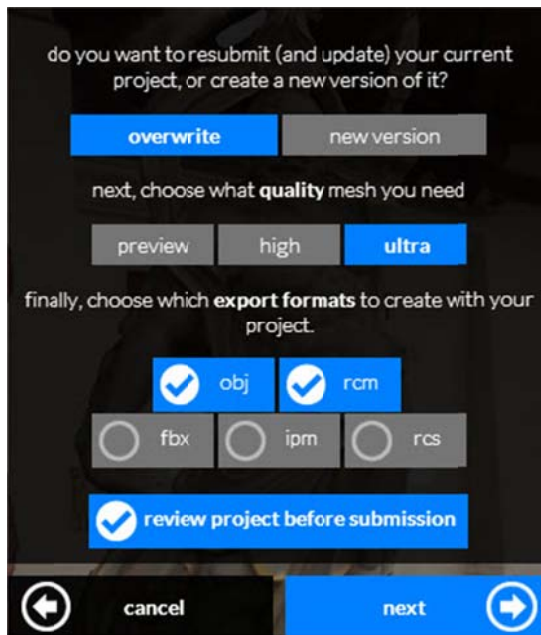
This will invoke the Registration tab that will appear in the ribbon on the top of the screen.



The registration tab will offer ways to add either:

- SURVEY POINTS - to define the correct coordinates of the object
- DISTANCE - known distance so to set the correct scale of an object

Registration can be done when you start the project for the first time and prior to submitting the photos for a 3D reconstruction, OR, if you got that information later, you can reopen a reconstructed scene from the email or from the project gallery and Resubmit, this time checking the 'Review project settings option' that will give you access to the advanced tool after reconstruction.

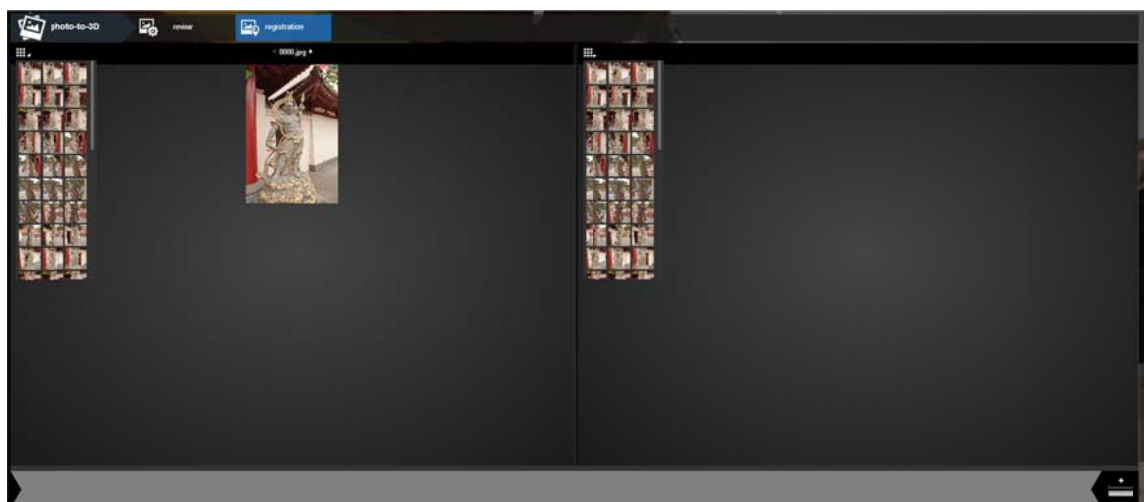


ADDING SURVEY POINTS

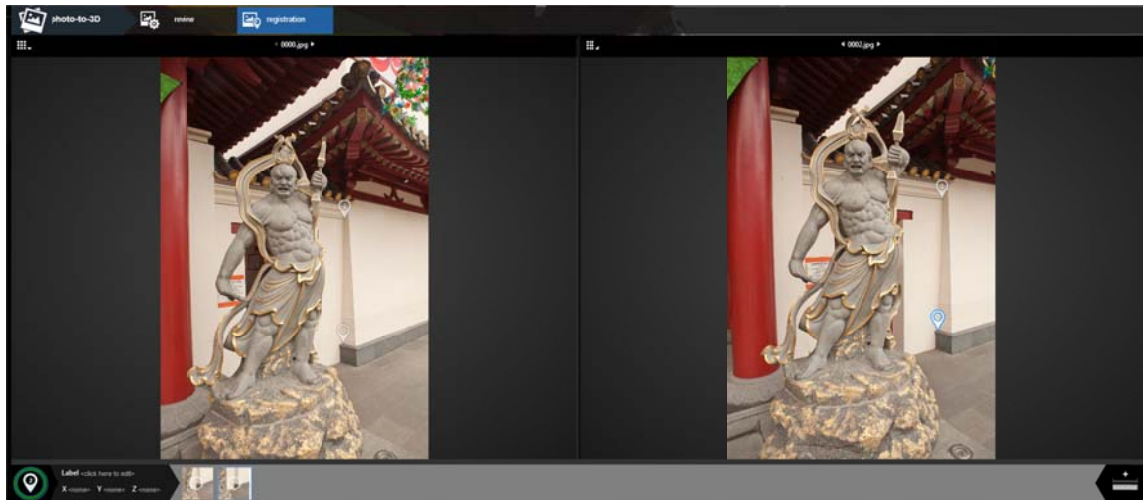
Survey points are collected on-site using 'Total Stations' or laser scanners. They are 'hard' 3D points used in the stitching process to make it more robust, and to scale or locate your 3D model. To add a survey point, select Registration.

The window will change into a split window as the one shown below:

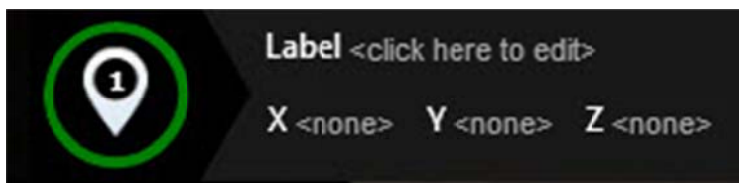
In the left window you will have a choice to select one photo and on the right side, you select another photo that is different than the one on the left, but has some common points.



You should then select a point on the left photo (click, a magnifier glass will zoom into the photo and click a point of which you have survey coordinates, and do the same on the right photo, trying to find the same point)



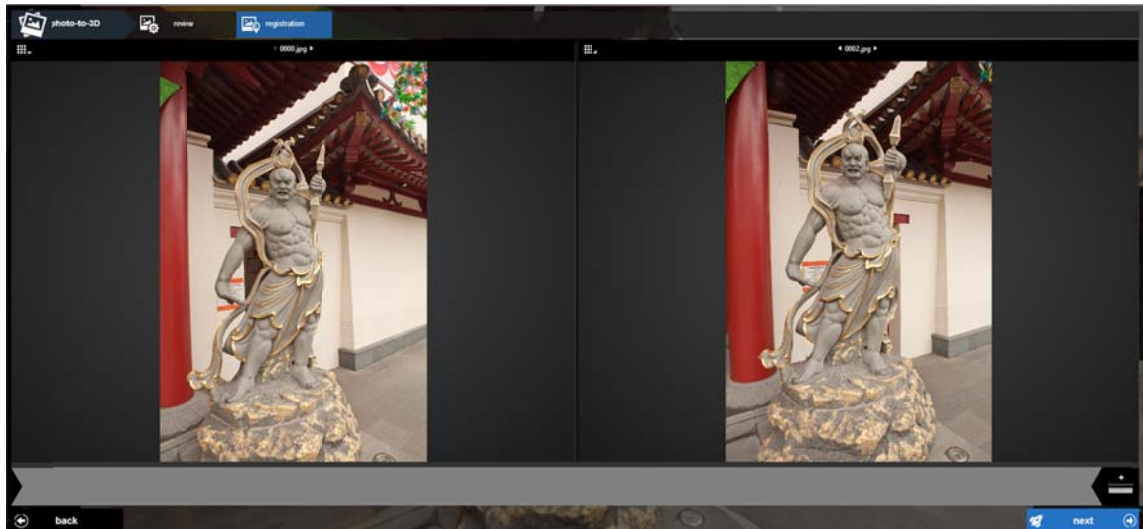
With this, you have helped the system to identify a point in space and now you can go on the bottom left of the screen, see the defined point and can fill in the X, Y and Z coordinates



After this, click Next and resubmit the scene.

NOTE:

When you start the process of defining the points, and click on the photo, your mouse pointer will turn into a magnifier glass. You will get a message about the mouse control, please accept. The magnifying glass will help locate in detail a point on the photo for which you have coordinates. You can change the zoom by scrolling the mouse wheel. Each time you use the magnifier glass, the last set zoom factor will be used.



Note: ReCap Photo currently has a limitation of 6 decimal places when it comes to inputting coordinates. Inputting coordinates with more than 6 decimal places might result in incorrect distances.

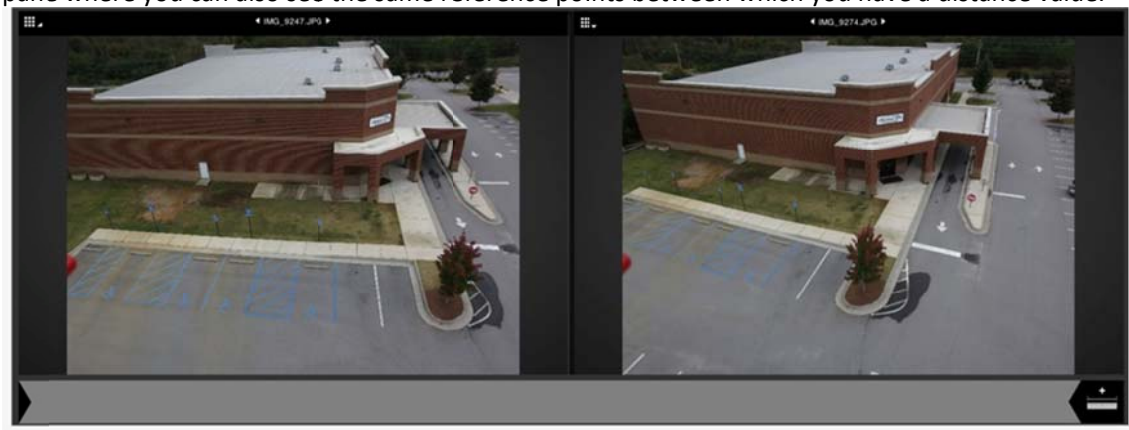
INPUT KNOWN DISTANCES

Photogrammetry does not have a sense of scale. When we create a 3D model from photos the actual size of the reconstructed 3D object is unknown. If you know the distance between points on your original object you can set a distance to your model and thus scale the model to its actual size.

Like the survey points, this can also be done prior to submitting your photos for 3D reconstruction or afterwards, by selecting the advanced options and the Registration tab

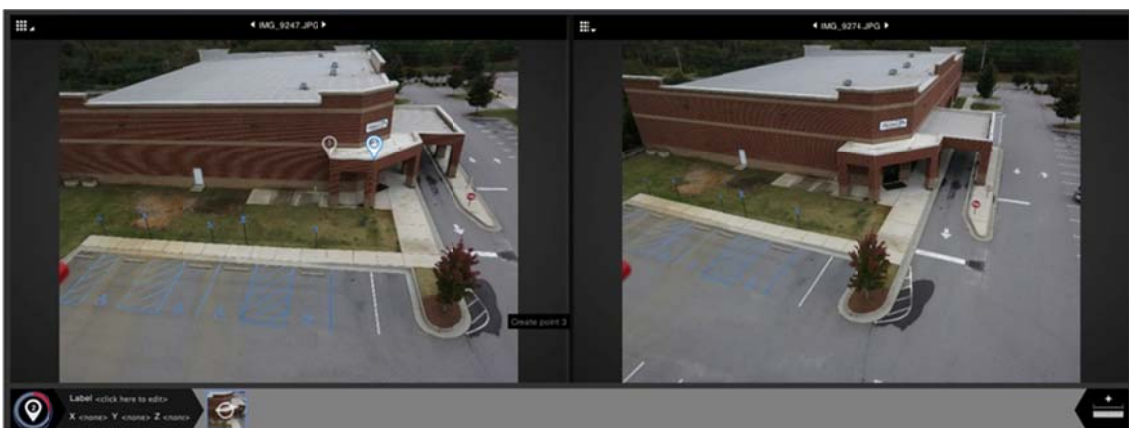
To start the process for setting a reference distance, after uploading the photos (or it's a resubmit, after selecting Review project settings) select the advanced tools in the side bar and then, in the blue ribbon, click on Registration.

The same split UI window appears. Here you pick one image in the left pane that shows the part of the object for which you know the reference distance, and then select another image in the right pane where you can also see the same reference points between which you have a distance value.



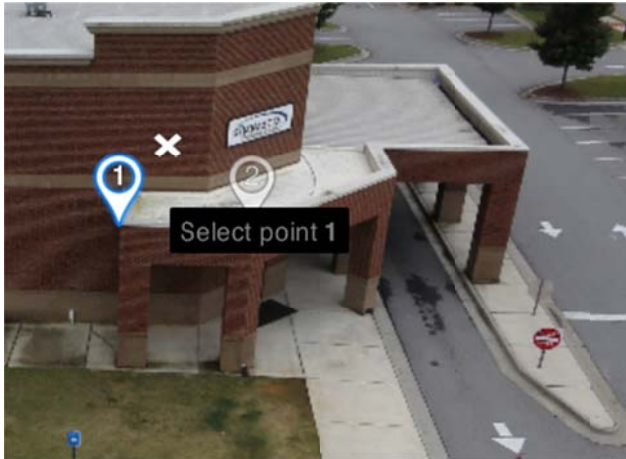
What you will need to do is identify a pair of the same points in both images and then set a reference distance between them.

Start by clicking in the left pane to create Point 1. In the same pane, click again to create Point 2.



Now move to the right side and in the right pane click the spot that matches the Point 1 from the left photo and click to create a Point 1.

VERY IMPORTANT: before clicking in the right photo, you must activate point 1 , so that the system understands that you are creating a matching point to Point 1. Repeat for point 2: Select to activate Point 2 in the left photo, and then click on the same point on the right photo, to create Point 2 there.



Do the same for Point 2. Click first in the left pane on Point2 to activate it and then click in the right pane on the same point.

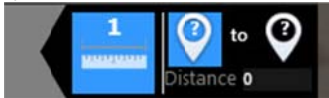
You should end up with point 1 and 2 in both the left and the right pane.



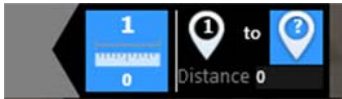
Once you have successfully created Point 1 and Point 2 in both images, you go to the distance icon on the bottom right of the screen. (make sure you didn't click that icon prior before the above was done)



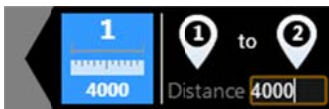
Only now should you click on the reference distance tool, located in the lower right corner of the screen. When opened, click on the tape measure icon and then click once on the icon with the first question mark, and then in any of the two photos on Point 1. This will set Point 1 .



Now select the second icon with the question mark and once selected, click on Point 2.



If you made that correctly, your two icons on the right of the tape measure should read Point 1 and Point 2. After this, simply type the known length between those two points.



What you should end up with is a blue line that connects point 1 and point 2 in both of the panes.



(Note that in the current release we do not let you define the units for the distance.)

*

The above covers just about everything you can do in the current release of ReCap Photo.

5. WHAT NEXT?

If you made good photos and a successful 3D reconstruction, you probably ended up with nice 3D mesh models. Even though they are high quality meshes and the textures are of best possible quality, you might find that the models have errors, holes or spikes.

To fix those, you will need to use a mesh editing software which can be any mesh modeling application that you might be already using.

However, note that when you ask for Ultra high quality, you will get such dense meshes that it might be very difficult to open them in many modeling applications as they were not designed to deal with meshes of such density and size.

To address this problem, we started a technology preview of software specifically designed to handle such huge meshes and help you identify potential problems, fix them, clean up the scene and prepare the models for publishing or digital fabrication (3D printing as example). The software is powerful, fast and real fun to use!



The first tech preview of that software is called Project Memento and you can find the link to the download and all relevant information on Autodesk Labs. follow this link to access Project Memento's labs site:

<http://labs.autodesk.com/utilities/memento>

6. 3D PRINTING

While we still cannot claim to be able to fix all issues in a mesh with the early labs preview of Memento, we have been having some great results 3D printing the models that we fixed in Memento.

Here an example of a statue of which photos were taken, a mesh model was created using Autodesk Recap Photo, the mesh was fixed and prepared in Memento and directly printed with OBJET 3D printer.

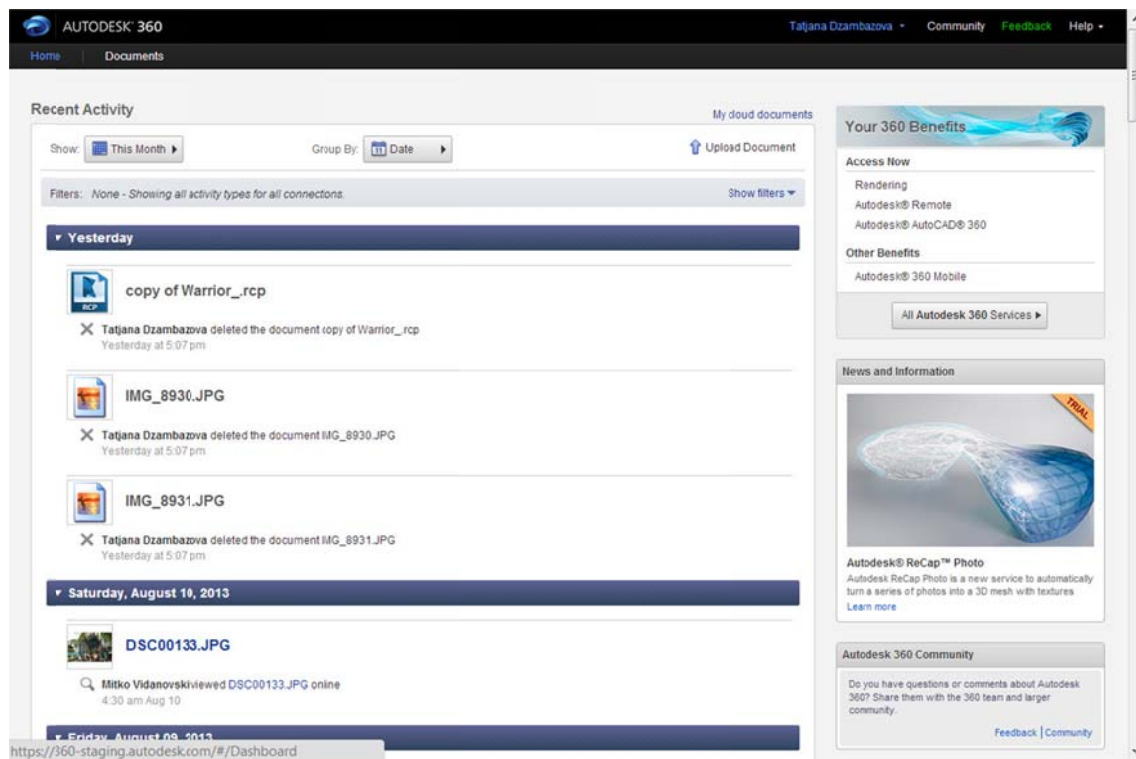
		
RIP	MOD	FAB
ReCap Photo	Project Memento	OBJET 3D print

7. MANAGING MY PROJECTS and STORAGE

As mentioned at the beginning of this document, to access ReCap Photo, you will need an account on Autodesk's cloud platform: Autodesk 360. Signing up for the account is free and your A360 account will come with free 5GB space.

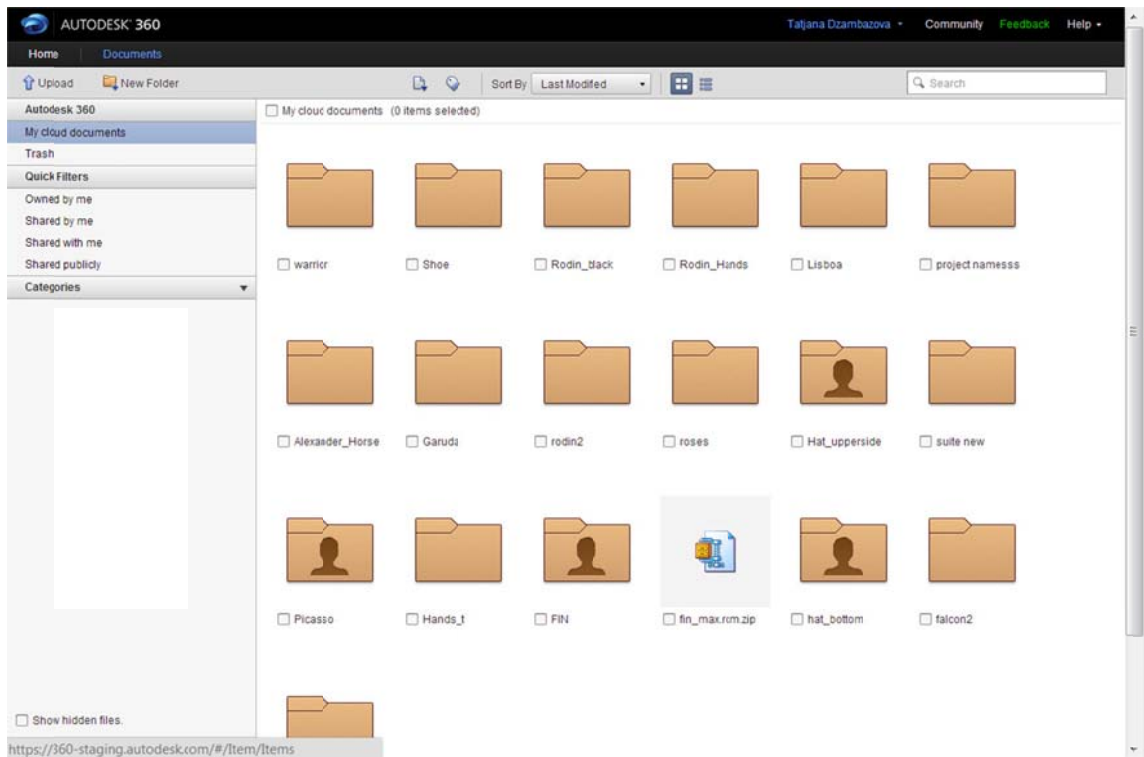
You can go directly there using the link from the ReCap landing page or go to 360.autodesk.com to sign up.

Once signed up, when you click on the link Access Autodesk 360 (located on the bottom of the ReCap Photo page), you will see a page that looks something like this.



Might look confusing, but don't worry: go top left to the Documents Tab and once you click on it, all the projects you create in ReCap will be there. (if you haven't done any scene on ReCap Photo as yet, the Documents folder will be empty).

It is here that you can manage your ReCap Photo projects, delete or share them with others (right click on any of the folders and say share). Obviously, you can use this space for storing or sharing other type of data.



Know that currently there is no way to increase the storage space so when you are close to reach the limit (this will always be displayed on the Landing page of your ReCap Photo site), you will need to download your projects and delete them from your A360 account. Do not forget to empty your trash bin that is located in the left pane of your Documents tab on A360.

Please remember which email address you used to sign up on Autodesk 360, as the email informing you that a scene is ready with the calculation and can be seen online, will be sent to that email address.

8. NOTES for existing users of ReCap Photo on A360

Those of you, who were the first testers of ReCap Photo trial on A360, know that the old way of accessing the service will still work. We believe however, that this front end will allow for clear and more pleasurable experience. Managing your folders, deleting or sharing projects etc. will still need to be done on A360.

9. KNOWN ISSUES, LIMITATIONS and BUGS

Limitations

- **BROWSER:** You will need to use Google Chrome as the browser. We are using a Web GL based 3D model viewer to preview 3D models in A360 and thus Internet Explorer are not supported.
- Try not to exceed 200 photos per reconstruction.
- Fisheye lenses are not supported (GoPro lenses, 8mm SLR, or any other fisheye lens). We only currently support rectilinear lenses
- 5 GB storage limit of the A360 storage
- **3D Web Viewer** As previously mentioned, note that the viewer we currently use to preview the generated 3D scene has limitations in the size of the mesh and the quality of the texture that it can display, and thus what you will be viewing on screen is only a proxy and will not do justice to the actual quality of the mesh and texture, when processed in High or Ultra resolution. You can see the high quality results once you import the exported meshes in Memento, Maya, 3DsMax, Mudbox etc.
- ReCap Photo currently has a limitation of 6 decimal digits when it comes to inputting coordinates. Inputting coordinates with more than 6 decimal places might result in incorrect distances.

10.ADDENDUM - How to take photos that are good for photogrammetry

What makes photos good for photogrammetry?

The photogrammetry process looks at series of photos and reconstructs the camera location, orientation, lens type and lens distortion. It does that by comparing and matching pixels/points across photos in the Entire Scene and match/ triangulate on visual features. This means that you should follow the following guidelines:

ENVIRONMENT (Lighting conditions)

You should avoid any environment in which the light creates strong contrast shadows over the object you shoot. Shadows are enemy to the reconstruction process.

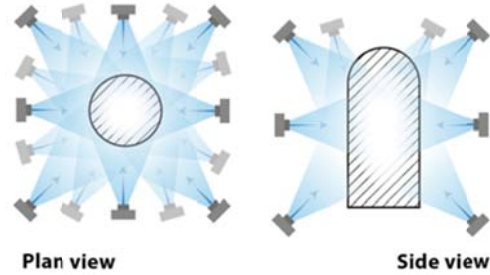
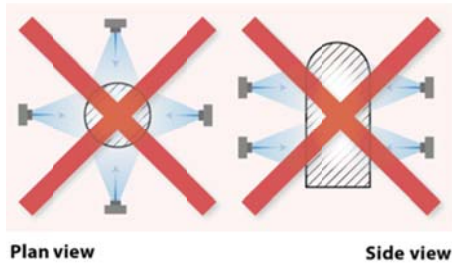
- If you shoot in interior
 - The object must be placed in a room with diffuse light that does not produce contrast light or shadow.
 - Do not use the flash.
- If you shoot outside
 - Avoid shooting at midday under strong sun. Best times are early in the morning or later in the afternoon

EQUIPEMENT

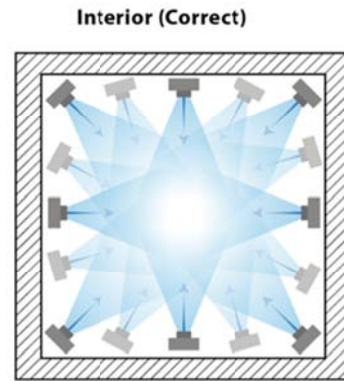
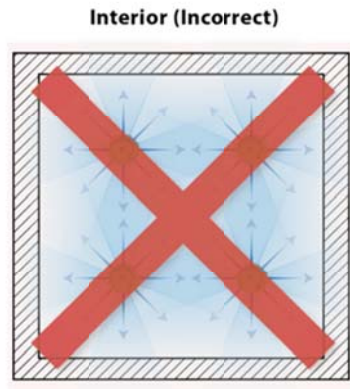
- You can get good results with any camera. However, plastic lenses only go so far in terms of sharpness. If you are serious about this process a good lens makes a difference.
- Try to shoot the photos with a fixed lens. Fixed lens have no focal change which is good for the photogrammetry process. A 50mm lens is good.
- Whenever possible, shoot with a tripod and if possible a clicker. You need this because in order to make the entire photo sharp, you will have to set a wide depth of field. This means that a very small amount of light will be coming in the camera so you will need to set your shutter speed long. This makes even a tiniest of shake of the camera result blurry photos. The tripod and a clicker will assure sharp photos.

SHOOTING STRATEGIES – SCENE SET UP

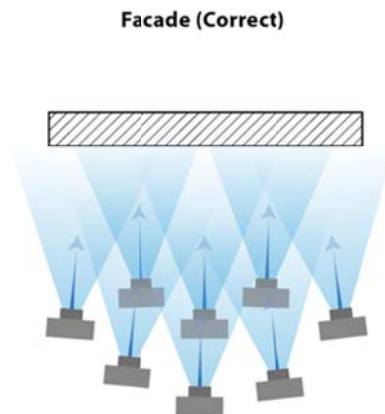
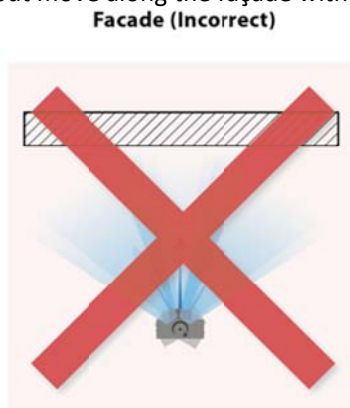
- Make sure that the object you shoot is always in the middle of the photo and fills most of the frame
- Use rich background. If you shoot a single object, avoid placing them on a monochromatic surface. If the surface is monochromatic, add many other smaller objects around the target object. The algorithms need as many different references in the space to do better calculation.
- Avoid green photographers screens (ChromaKey). Photogrammetry doesn't do well with them.
- Don't move objects around during the shoot and don't have people walk around. Movements in the photos create uncertainty in the reconstruction.
- Shoot all around the object to cover each aspect of it with multiple overlapping photos. Shooting each 5-15 degrees on the same height of the object is a good practice. If you want to have a good level of detail, you should shoot at 2-3 different heights of the object, ending up with 70-100 photos for a small to medium object and 180-200 photos for a building.



- Take enough photos. It is not enough to have many photos, but they must also have a good overlap between them. If the overlap is too small or non-existent, the software might not take an entire cluster of photos in account for the reconstruction, and the reconstruction will be inferior to its potential.
- When shooting Interiors, follow the directions on the diagram below. Instead of standing in the middle of the room and rotating around your own axis to shoot the photos, move along the walls to shoot in the other direction



- When shooting Exteriors, again, avoid standing in one spot and shooting 'panorama like' spherical photos but move along the façade with the camera.



- Don't have people walking cross the scene while the photos are taken. Anything that makes a movement in the scene makes it hard for the algorithm to compare pixels between the photos

PHOTO QUALITY

- The photos must be in focus SHARP and CRISP throughout the entire scene (not just the object of desire) as we compare pixels from the entire photo. If you happen to have few blurry photos among the entire set, remove them before making the reconstruction.

- Avoid blurriness in any part of the photos (ah, that beloved Depth of field effect). That will not work very well for photogrammetry. Do not assume that all is well if the object you try to shoot is sharp. We calculate the entire scene, not just the target object and any blurriness will confuse the algorithm.
- Do not change the zoom if you don't have a fixed lens. Rather move towards and away from the object.
- Do not change exposure during the same acquisition.
- Set ISO to 100, it works on pretty much any reconstruction. Or simply keep the ISO low. High iso brings noise which should be avoided.
- The ReCap Photo service currently accepts JPEG format only. However, if you shoot in RAW, you will have the ability to do some changes in the RAW images that WILL affect the quality of the 3D model. You can always re-export JPEG's from the Raw images using photo editing software such as Adobe Photoshop or Bridge.

KNOWN TECHNOLOGICAL LIMITATIONS OF PHOTOGRAMMETRY

The photogrammetry process does not work on shiny, transparent or highly glossy objects. This is due to the fact that these reflect the surrounding which makes the same point on one photo to be in a different color on another photo, making it impossible for the algorithms to calculate the scene.

Enjoy using ReCap Photo and please send any questions, suggestions and wishes on the ReCap Photo forum http://feedback.autodesk.com/cloudservices/products/cloudservices_recap

Want to know more about Project Memento, Autodesk's fun, fast, powerful solution for fixing huge meshes ? Go here: <http://labs.autodesk.com/utilities/memento>

For any questions or suggestions for improvement of the tutorial, please contact recap.photo.support@autodesk.com or Tatjana.dzambazova@autodesk.com