

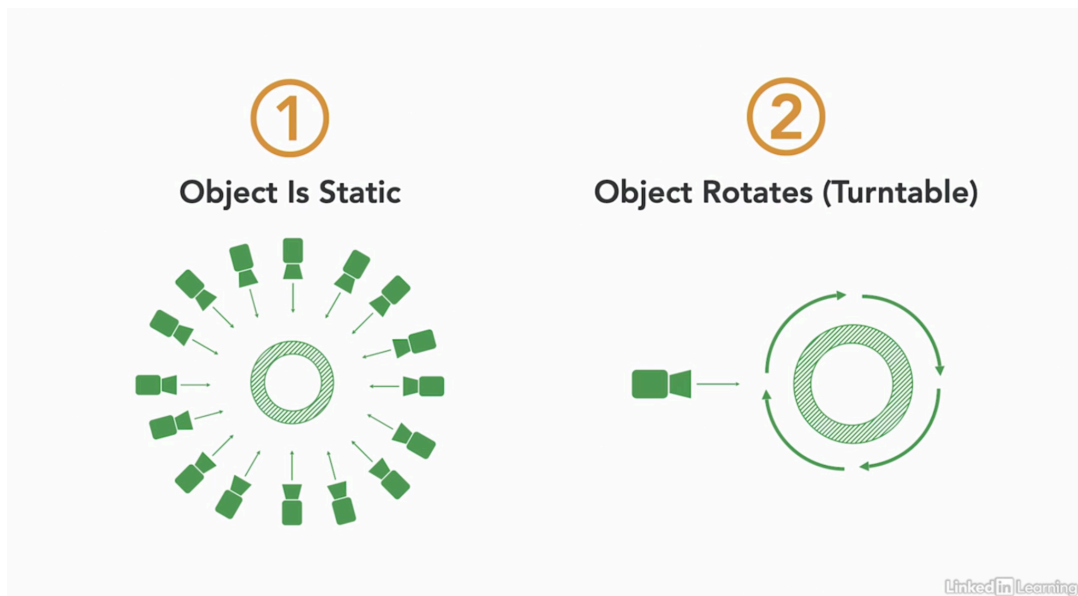
3D WORKFLOW

I. SHOOTING YOUR OBJECTS USING TURNTABLE METHOD

Spending some time planning your shot, following are some tips for SHOOTING your object:

- ISO lowest value possible to avoid noise (200ISO)
- Set a focal distance for your camera avoid using zoom (choose the standard focal length for your camera for example DSLR 50mm, Nikon full frame is 35mm, Canon full frame is 40mm)
- use manual mode for your camera.
- Since your object should be in sharp focus, avoid shallow depth of field, suggest setting your aperture to at least F11 preferably F22
- set white balance
- Lighting: bright diffuse lighting, avoid shadows. Best scenario is diffuse daylight
- **Turntable:** it is possible to create even lighting using 2 sources
- **Turntable:** Make sure there is contrast between the object and background (black object on dark grey background will create problems in Metashape masking). Try to avoid having movement in the background (for example paper or fabric that shifts or moves). Avoid reflective surfaces.
- If you are shooting around an object, use newspaper or patterned background
- **Turntable:** use tripod + avoid changing anything in the scene except the rotating object. Set your focus and remove item to shoot background.
- Each photo should effectively fill the frame. Do not crop or geometrically transform the images. (suggest using horizontal or all vertical)
- Shoot pictures of the scene with a lot of overlap 80% preferred
- **Turntable:** Rotate the object but also capture it from - top, bottom and side if possible. The object needs to retain its shape to do this.

OBJECT: Avoid transparent, reflective, glossy, or metallic objects. Some objects can become reflective with certain lighting environments. **Avoid symmetrical and monochromatic objects. Size also makes a difference** - a small figurine is difficult and needs more images to render than a large figurine. A flat object is also very difficult - if you can't prop it up and shoot around it is probably a more difficult object to capture. Organic objects work the best, manufactured items tend to have qualities that make mesh generation difficult - please consult before choosing.

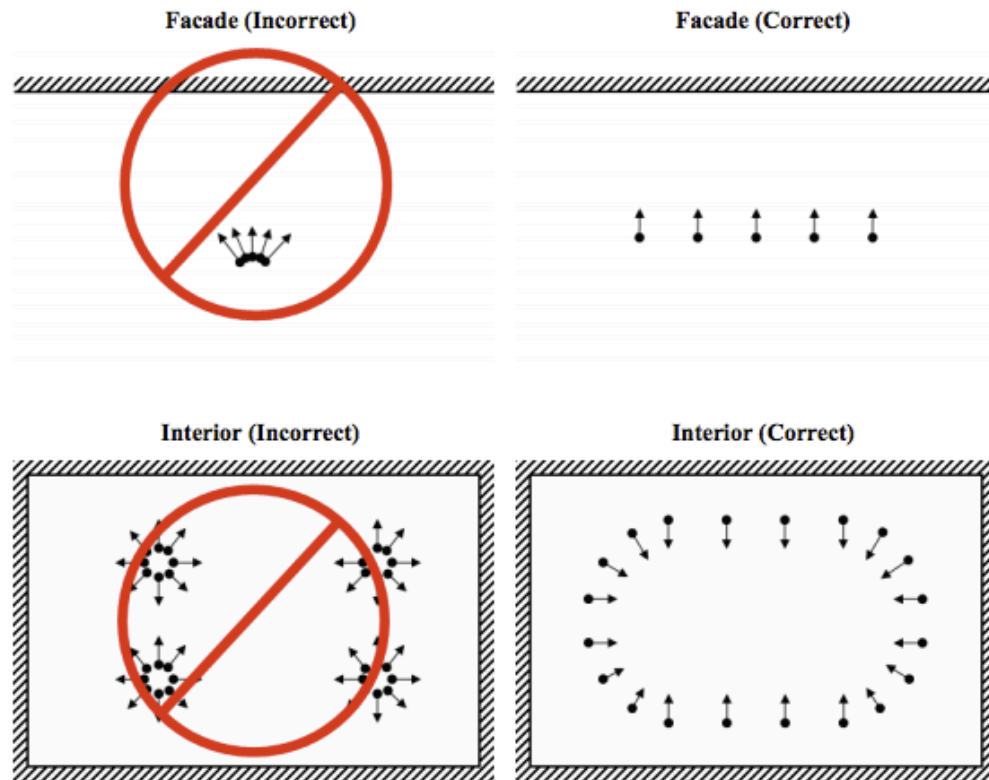


II. SHOOTING A SPACE OR FACADE

This can also be a detail (bricks on a building) or an outdoor object like a boulder

Following are some tips for SHOOTING a scene:

- Avoid direct sunlight and sharp shadows
- shoot with significant overlap
- avoid reflective material: glass, metallic fixtures that are not anodized or weather worn, mirror, etc.
This will not work!



Examples:

[SEE Example Metashape Project Video from Ari](#)

[See Taylor's How to Video \(Turntable\)](#)

II. PREPARING IMAGES

Image size is not as crucial in 3-d modeling as it is in 2-d images (a mesh is vector based)

Open image first in Camera Raw or Lightroom and apply tonal and color corrections, add slight contrast through exposure dialogue box, sharpen. Sync files in the Library. LIGHTROOM:

Export files as jpgs Should have @50 -100 images (tif is recommended however larger files take longer!)

3D WORKFLOW POST-PRODUCTION

I. METASHAPE: creating 3d mesh from image files

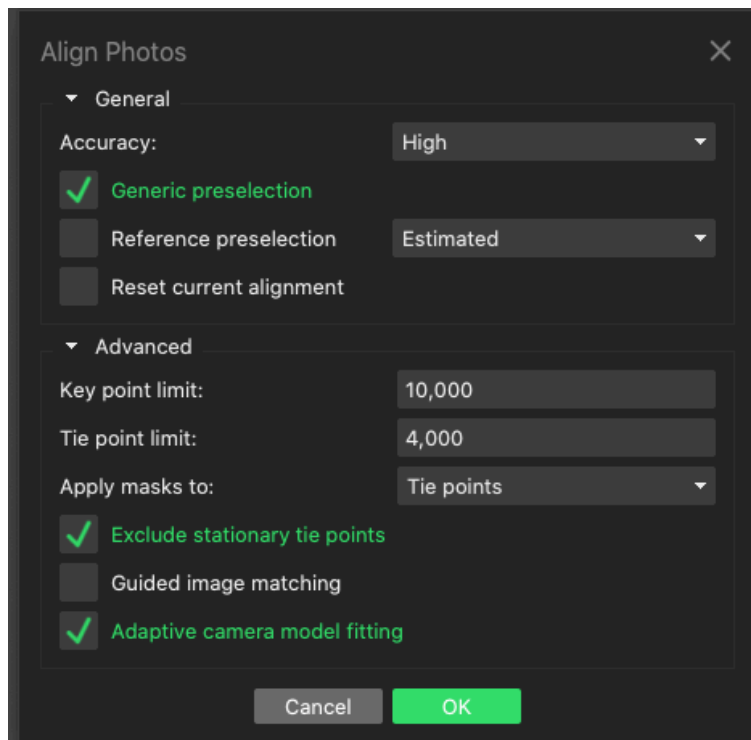
Some instructions are only for use with a turntable if you shoot by moving around the object or if you are shooting a facade disregard these instructions.

Before you begin:

Tools < Preference < under Graphics make sure any GPU are checked

3D space: use wheel or tracking pad to zoom in and out, without object selected rotate by clicking and dragging in the area around object. Use numbers key to rotate object using different axis 1-9. Reset view 0

1. Workflow < upload camera image
2. **TURNTABLE ONLY:** Select the **first image without an object** using the rectangular selection tool M select the entire frame empty frame and right click and choose “add selection.” This masks off the area around your object if you are using a turntable and have not changed anything else in your scene.
3. **Workflow < Align Photos (high and estimated)**
TURNTABLE ONLY: Advanced: Apply mask to: *Tie points*. Select Exclude Stationary tie points and Adaptive camera model fitting

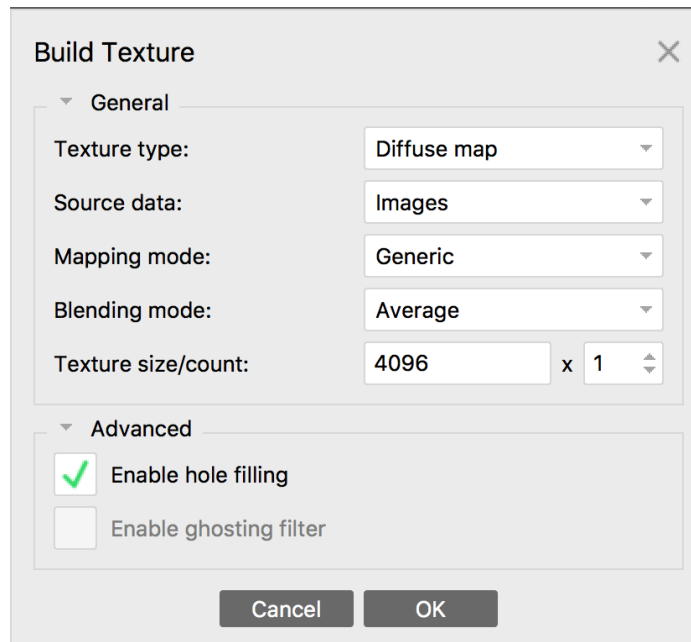


- 3a. If there are issues with your model or images (disable questionable images) run this again checking “reset current alignment”
4. **Workflow<build Model** (Source data: **Depth Maps**, surface type: **Arbitrary 3D**, Face Count: **High**, Interpolation: enabled, calculate vertex color selected
5. **Clean up outliers**: Select object using the freeform selection tool and select crop key (be careful about clipping the actual object) or Edit<Invert Selection to select outliers and press delete. Continue deleting outliers individually (select and press delete key or the “x” button).
Clean up outliers: Tool>Dense Cloud>Filter by confidence (no higher than 3)
Tool>Dense cloud>update dense cloud

Rotate the object using number key, 2,4,6 &8

Tools< Mesh<Smooth Mesh: to smooth out (start at 20 or less) to smooth mesh

6. **Workflow<build texture** (Texture Type: Diffuse Map, Source data: Images, Mapping Mode: Generic, Blending Mode: mosaic, Texture size: 4096 x 1 map) Enable hole filling



7. **Export > Export Model** .obj, .mtl, jpg (**precision 12**) and save Metashape project (.psx) into your 3D folder (with jpgs).

III. UPLOAD TO SKETCH FAB

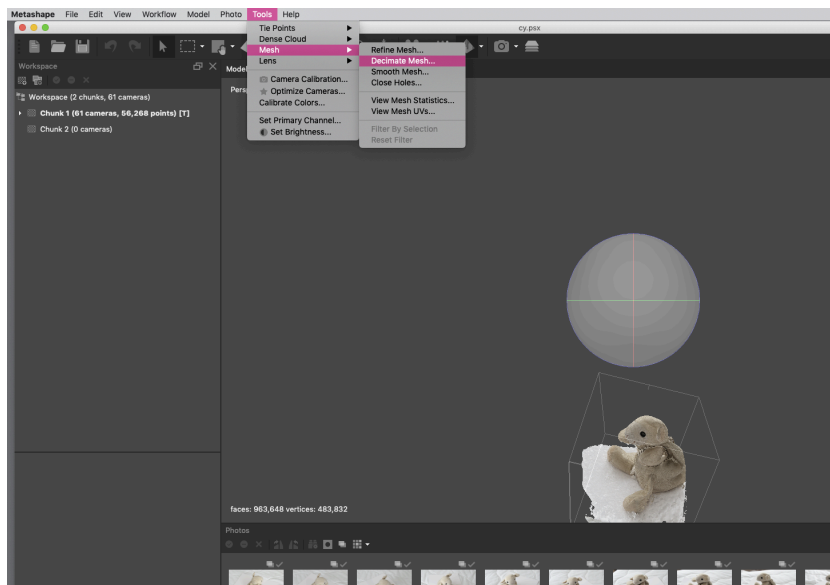
Create a free sketchfab login and password the file size limit is 50mb with one upload a month - however if you make your model downloadable you can add an additional upload.

<https://help.sketchfab.com/hc/en-us/articles/202508836-Uploading-3D-Models>

UNPLOAD TO SKETCH FAB

1. Please make sure you ask for your finished a repaired file from LGS. Let them know that you need to upload to sketchfab. These files will be easier to upload since Metashape exported files are often times too large.
2. Select your (.obj, jpg and .mtl) files and right click <compress/archive three items
3. In sketch fab click the orange upload button and add your zipped file.
4. If you lose your texture (jpg image) you can either find it or upload separately
5. Edit Settings<base color< texture manager either find or upload your texture jpg.
6. **MAKE YOUR MODEL DOWNLOADABLE:** choose edit properties

PLEASE NOTE the file size might not fit your Sketchfab membership. If you're using the free Basic membership, your file size limit is 50MB. If sketch fab does not allow you to upload. Follow directions below for decimating your mesh. **If you decimate your mesh you may need to recreate your texture** - This will not take long.



You may also decimate your mesh using Zbrush (which is on the department computers)

1. ZPLUGIN<DECIMATION MASTER
2. Select Keep UV to turn on Pre-Process Current

3. Set % of Polygon's to decimate (start with 50%)-- please note you can undo and process again if this doesn't work.
4. Save obj and jpg using a different name (model_new.obj, jpg)
5. Zip files and upload to sketchfab

IV. STEPS FOR PRINTING

1. Please make an **appointment** with LGS as soon as possible. Zip your 3D folder which should contain linked images, metashape files and Exported model (obj, mtl and jpg) share files with LGS.
2. Email **lgs@nyu.edu** mentioning the class and make an appointment to prepare your image to print (**M-F: 11:00am--5:00pm**). This is either remote or in person, please specify giving a couple of options for meeting.
3. Please note that you most likely will need more than one meeting with Laguardia Studio. Please be proactive about making appointments, if you do not hear from them after 24 hours, email them again!
4. Please make sure you ask for your updated files (obj, jpg .mtl back) to upload to sketchfab
5. Once your file is ready to print, LGS will send an invoice. Forward this to Jordan **jcc9859@nyu.edu** with a request for a grant check. Jordan will send the payment directly to Laguardia Studio and send you a confirmation email.
6. It is then your responsibility to pay 10% up to \$TBD. The department will pay 90%. You can pay by credit card calling LGS **212 998-3454** (M-F: 9:00am - 5:00pm). Once fully paid LGS will put your print in the print queue. This is an important step that could keep your file from getting into the queue.
7. Please note there is a strict 10-day turn around (that is 2 weeks).

VOCABULARY

OBJ (or .OBJ) is a geometry definition file format first developed by [Wavefront Technologies](#) for its [Advanced Visualizer](#) animation package. The file format is open and has been adopted by other 3D graphics application vendors. For the most part it is a universally accepted format.

The OBJ file format is a simple data-format that represents 3D geometry alone — namely, the position of each vertex, the [UV position](#) of each texture coordinate vertex, vertex normals, and the faces that make each polygon defined as a list of vertices, and texture vertices. Vertices are stored in a counter-clockwise order by default, making explicit declaration of face normals unnecessary. OBJ coordinates have no units, but OBJ files can contain scale information in a human readable comment line.

photogrammetry- scanning with a camera. To capture a 3D scan with a camera, you take multiple photos of an object, 360 degrees around from both high and low angles. Then you process these photos through a software program that extrapolates a 3D mesh from the 2D photographs. By comparing many photos, the software uses a process called triangulation to figure out the position of the object and the camera. And then extrapolates the shape of that object. It creates not only the 3D mesh that shows the form of the object, but also builds an image map that shows the colors of the surface.

Data in a 3-d printed file: called a **mesh**, it's made up of a collection of faces sometimes called triangle. Faces are composed of edges, where the edges met is called vertices

A **point cloud** is a set of data points in some coordinate system. In a three-dimensional coordinate system, these points are usually defined by X, Y, and Z coordinates, and often are intended to represent the external surface of an object. **Point clouds** may be created by 3D scanners.

Printer: HPMulti jet Fushion 580 powder nylon fused with binder

A more expensive option: StratasysJ850 Polyjet printer prints full color using polymer. Shoots inkjet like dots that are hardened under a UV Light.