

LU BARN

# *Matter and Form 3D Scanner V2 User Manual*



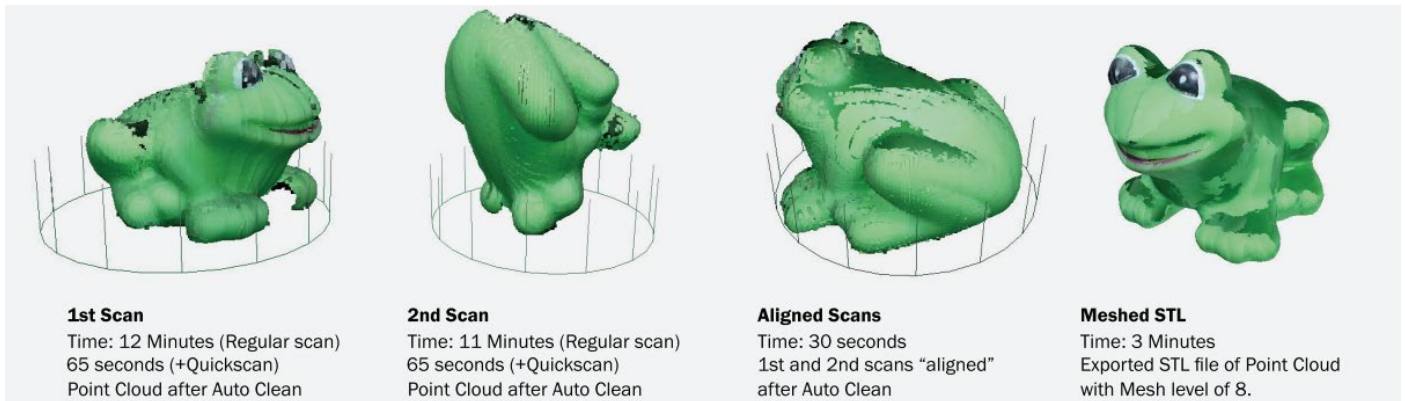
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# DO's & DON'Ts OF 3D SCANNING

## BASELINE PERFORMANCE



### 1st Scan

Time: 12 Minutes (Regular scan)  
65 seconds (+Quickscan)  
Point Cloud after Auto Clean

### 2nd Scan

Time: 11 Minutes (Regular scan)  
65 seconds (+Quickscan)  
Point Cloud after Auto Clean

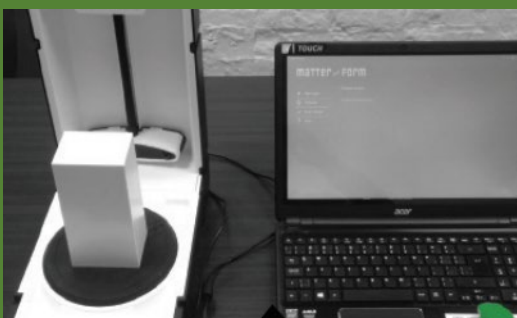
### Aligned Scans

Time: 30 seconds  
1st and 2nd scans "aligned"  
after Auto Clean

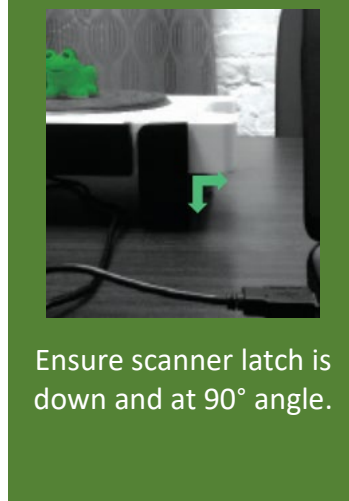
### Meshed STL

Time: 3 Minutes  
Exported STL file of Point Cloud  
with Mesh level of 8.

## The Do's of 3D Scanning



Plug into a USB port on your computer.  
(if scanner states "disconnected", try turning on/off the scanner 2 to 3 times)



Ensure scanner latch is down and at 90° angle.

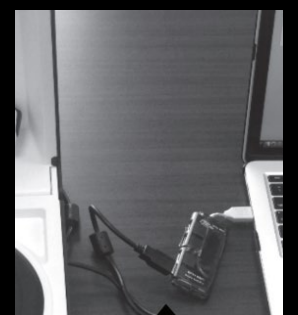


Secure wobbly/rolling objects to the turntable with plasticine, tape, or custom mounts.

## The Don'ts of 3D Scanning



Don't attempt to scan objects that are too large to fit on the scanner turntable.



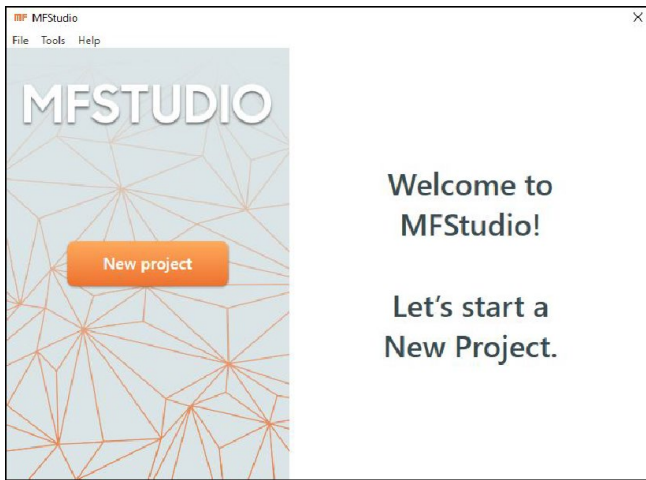
Don't plug into a USB hub.



Don't move or touch an object while it's being scanned.



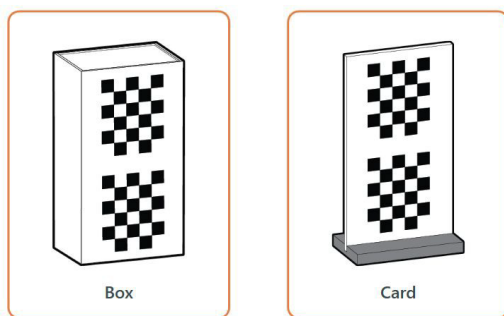
Don't powder or spray an object when it is on the scanner turntable.



## STEP 1 START

Click **New Project** on the MFStudio homepage. Enter a **Filename**, select a **Save to:** location, then click **Continue**.

To open a project, click the thumbnail of a recent project on the MFStudio homepage, or navigate to **Open** from the File menu.



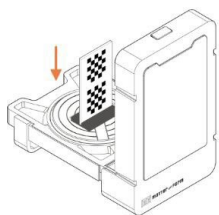
## STEP 2 CALIBRATION

Calibration will be needed when the scanner gets moved or lighting changes drastically.

Click to select the card calibration device, Follow the instructions to assemble the card, if needed.

Follow the instructions for Calibration Steps 1 and 2 in the software to calibrate your scanner.

The scanner turntable will rotate left and right, firing its lasers and collecting a range of data. Be patient and do not move the calibration card or scanner.



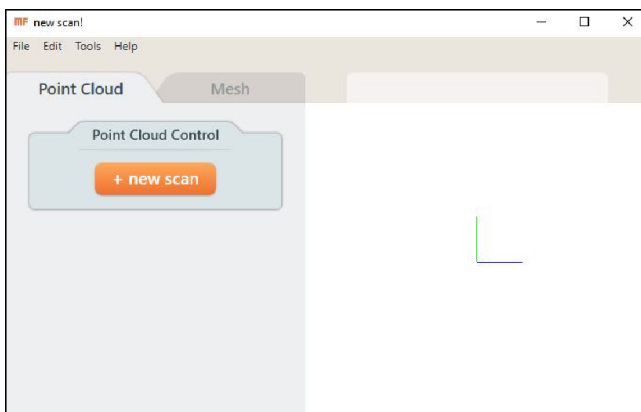
### Calibration step 1

Please place the calibration card in the centre of the turntable with the checkers facing the camera (as shown), and click "Calibrate."

Note: there may be a short grinding noise. This is normal!

Cancel Back Calibrate

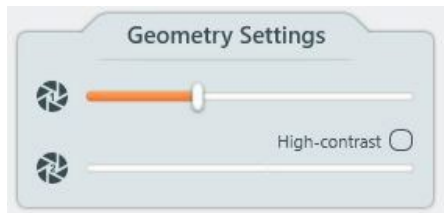
Step 2 will take slightly longer than Step 1 as the software compares the data between Step 1 and Step 2.



## STEP 3 SCANNING

Click **+new scan** to start a new scan. Clicking the tabs from the top of the sidebar on the Scan Setup page will let you choose between scanning modes: Choose **Regular Scan**





## STEP 4 PICKING THE BEST LASER EXPOSURE

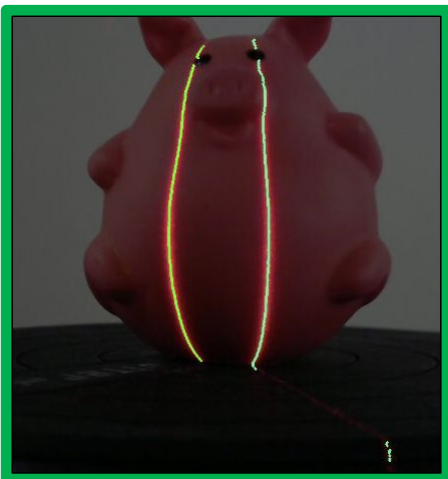
First on the Geometry Settings, use the slider controls to control the camera's exposure, making the laser lines visible for capturing an object.



### The Best Laser Exposure

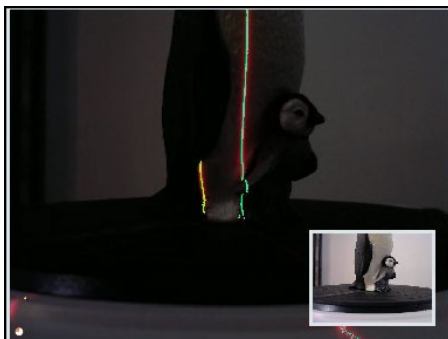
#### Bad Laser Exposure

Noisy laser lines with gaps.



#### Good Laser Exposure

The gaps are closed. This is a good set of laser lines

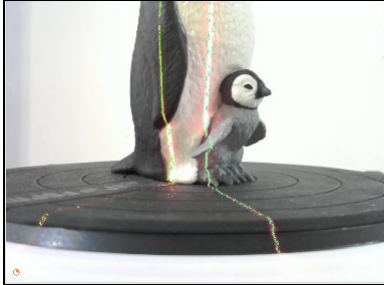
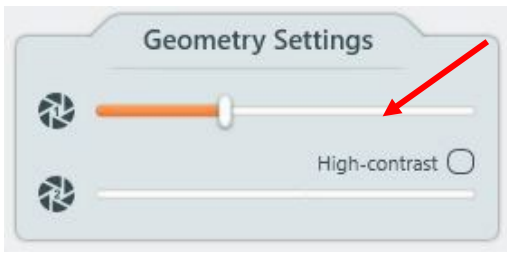


## STEP 4.1 HIGH CONTRAST LASER EXPOSURES

Some models cannot be scanned when it contain high contrast colours: gray, black and white.

Here you can see the laser lines when a darker exposure is selected. One colour shows well, but the other doesn't.

## Exposure 1

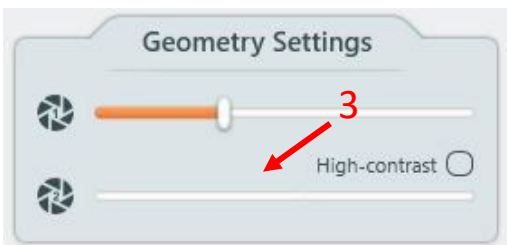


To set a different exposure for each colour:

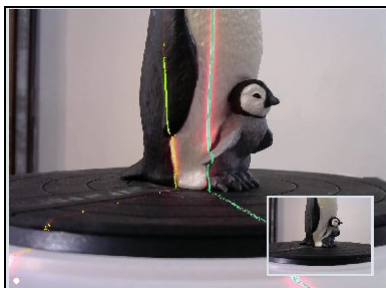
1. Adjust the top Geometry Settings slider for **Exposure 1** to capture clean laser lines on the light areas of the object.



2. Then, check the **High-Contrast** checkbox, which enables the second exposure slider.

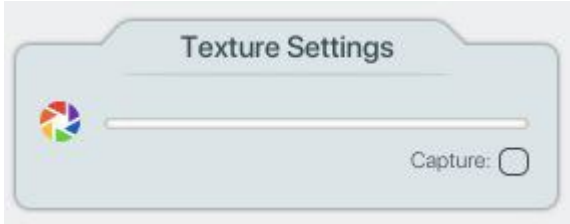


3. Then, adjust the bottom slider for **Exposure 2** until the dark areas of the model fill in with a clean laser line.





## STEP 5 TEXTURE SETTINGS



To capture textures, check **Capture** in the Texture Settings toolbox.

Adjusting the Texture Settings slider for the exposure that will be used for texturing.

### Picking the best exposure for colour



**BAD: Underexposed**

The textures with this exposure will result in a fairly dark object.



**BAD: Overexposed**

The textures with this exposure will result in hot spots and uneven colours

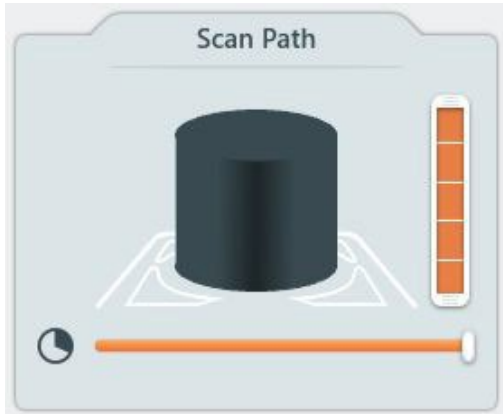


**Good: Best exposure**

Capturing textures with this exposure will result in hot spots and uneven colours

## STEP 6 SCAN PATH

Adjusting the sliders in the Scan Path toolbox will restrict scanning to only a portion of the object.



- **Height:** The vertical slider sets how high the camera head will move - each block of the slider represents another height at which the camera head will stop to complete a bed rotation (or pass) to capture points.



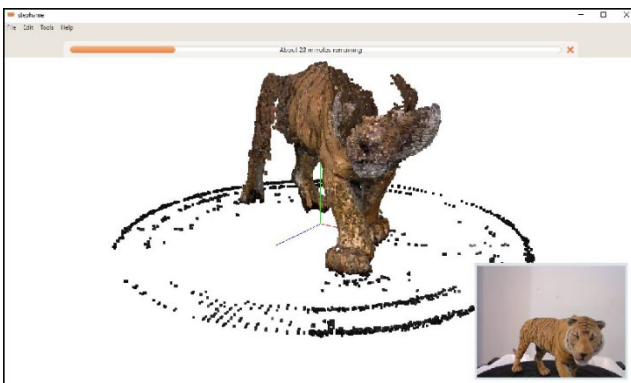
If unsure of the appropriate scan path height for your object, leave the slider full and cancel the scan's progress when your object is completely scanned. It will load in the Project Editor as is.

- **Degree:** The horizontal slider sets the degree of bed rotation for each pass (45° minimum). Moving this slider will restrict the scan bed's rotation in order to scan only a portion of an object.

Click **Scan** when you're happy with your settings.

## STEP 7 SCAN PROGRESS

The Scan Progress window displays points as they are captured during scanning.



Click the **X** icon by the progress bar to finish scanning at any time. The scan will load into the Project Editor as-is.

You can interact with the point cloud while scanning: To **SPIN**: Click and drag anywhere in the view window.

To **ZOOM**: Use the mouse wheel, or scroll, to zoom in and out.

To **PAN**: Right click and drag.

To **RESET VIEW**: After clicking the view window, press the "c" on your keyboard.

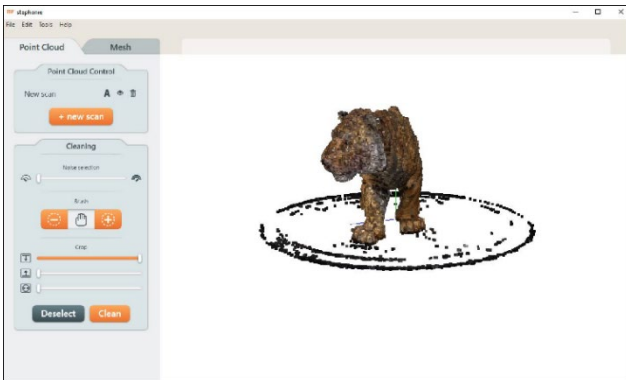


## STEP 8 EDITING

The Project Editor is designed for working on multiple scans of the same object simultaneously (though it functions the same with a single scan).

Sometimes a single scan can miss a feature of an object, like the bottom or top, that can be captured by performing another scan at a different angle (i.e. with the object on its side).

To add an additional scan to your project, click **+new scan**. From the Point Cloud Control toolbox you can:



Click to turn on/off visibility. Scans must be visible to clean or align them.



Click to delete a scan from the project.



Click to turn on/off alignment. Scans will align to the first scan selected.

## STEP 9 ALIGNING SCANS

Choose the point cloud in the desired orientation.

To begin the alignment process, click **A** on a point cloud in your desired orientation. This scan will be used as the reference for the next scan's alignment. Subsequent scans chosen for alignment will use all the previously aligned scans as their reference.

Alignment may take a few minutes depending on the size and complexity of the point clouds.

## STEP 10 CLEANING SCANS

There are three options for cleaning tools in the sidebar of the Project Editor: **Noise**, **Brush**, and **Crop**. Points selected by any of these methods will be highlighted in red. Click **Clean** to delete the highlighted points, or **Deselect** to keep them.

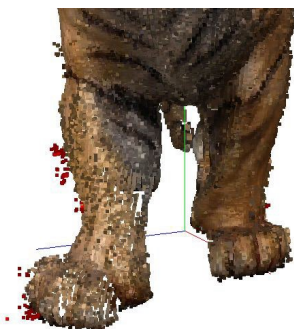
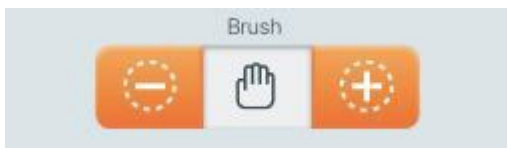
**Undo**, in the Edit menu, restores points that have been cleaned.



### 10.1 Noise Tool

The **Noise Selection** tool automatically highlights points for cleaning. Move the slider to choose how aggressive the selection will be.

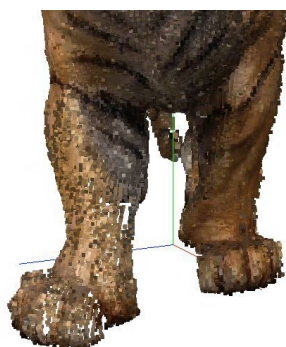
- *Points selected with the Noise Selection slider set in the middle.*



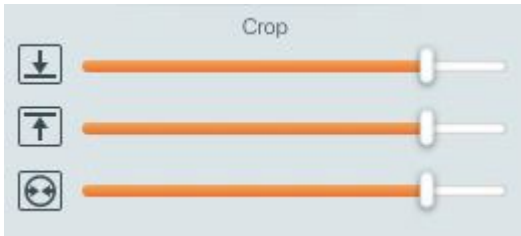
### 10.2 Brush Tool

The **Brush** tool manually selects (+) or deselects (-) points. Control the brush size using the square bracket tools ] and [. The hand button returns regular mouse functionality.

- *Before: Unwanted points individually highlighted*

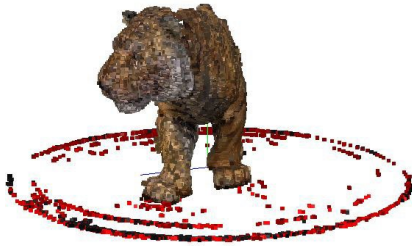


- *After: Unwanted points deleted*



### 10.3 Crop Tool

The **Crop** tool removes all points outside an area you specify. Use the sliders to choose points from the top down, the bottom up, or moving towards the center.



- *Points to be removed are highlighted in red.*



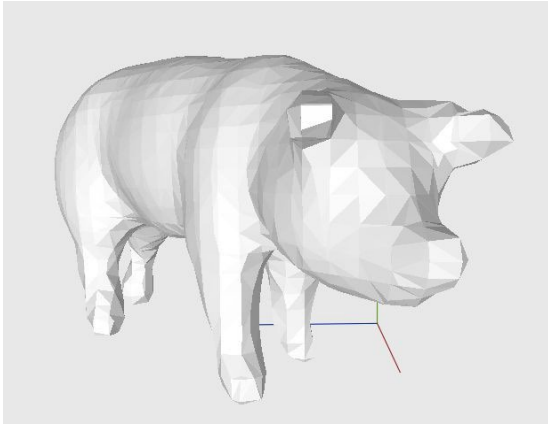
- *Result after clicking “Clean”*

## STEP 11 MESHING

1. To mesh a project for export, navigate to the Mesh tab within the Project Editor.
2. The Mesh Options slider controls the level of detail in the mesh: **to the right for lots of detail, to the left for low detail.**
3. If textures have been captured for the project, check **Enable Texture** to texturize your mesh.
4. Click **Mesh**

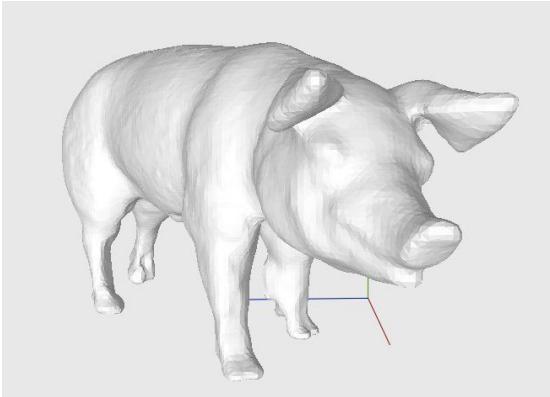


The ideal level of detail for meshing may vary by object and project. Further changes made to point clouds will not be reflected until **Mesh** is clicked again.



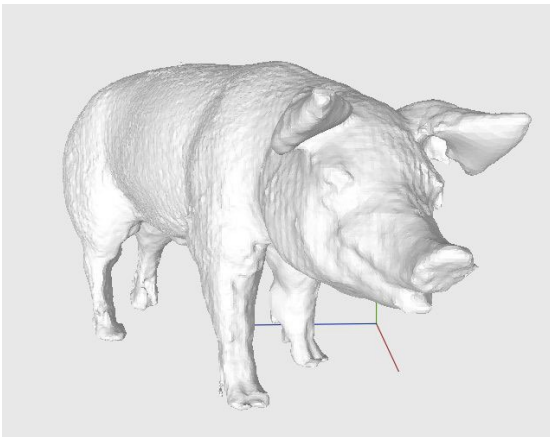
### Detail level 6

*Meshing with a low level of detail results in fewer, larger polygons and create a very smooth surface.*



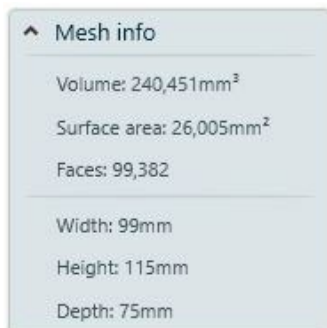
### Detail level 8

*Surface is smooth and detail is accurate.*



### Detail level 9

*Meshing with a high level of detail results in a dense polygon count that may make surfaces appear rough depending on your object.*



### Mesh Info Panel

The Mesh info panel displays mesh measurement information: volume, surface area and face count, as well as bounding width, height, and depth dimensions.

## STEP 12 SAVE AND EXPORT

To save the project file

Select **Save** from the File menu. Files are saved with the **.mfproj** file extension. **.mfproj** files can only be opened with MFStudio.

### 12.1 Exporting

To export your project in a different file format, select **Export** from the File menu.

1. Exporting with the Mesh tab open will allow exporting in other file formats requiring meshed models, like OBJ or STL.
2. Check Enable Texture box when you need to export the mesh with texture.

All file format units are in millimeters. Exported files cannot be re-imported.



Export file formats include:

FILE TYPE	DESCRIPTION
OBJ (meshed)	Use OBJ when working with animation or 3D printing programs. OBJ will only store your final mesh. OBJ exports contain multiple files, so be sure to export to an empty folder. OBJ and GLTF are the only file formats that will export textures.
STL (meshed)	Use STL when working with CAM or 3D printing programs. STL exports are watertight and printable in most cases. Some editing may be required to flatten or hollow your mesh before printing.
GLTF (point cloud or mesh)	Use GLTF when you need a small, quick-loading file for game development or digital display. GLTF is a new format that supports realistic textures.
DAE (meshed)	Use DAE when moving 3D models between software programs with incompatible file formats, as it stores meshes (without textures) as XML files.