



Working With Scanned & Imported Models

Presented by Michael Tyler



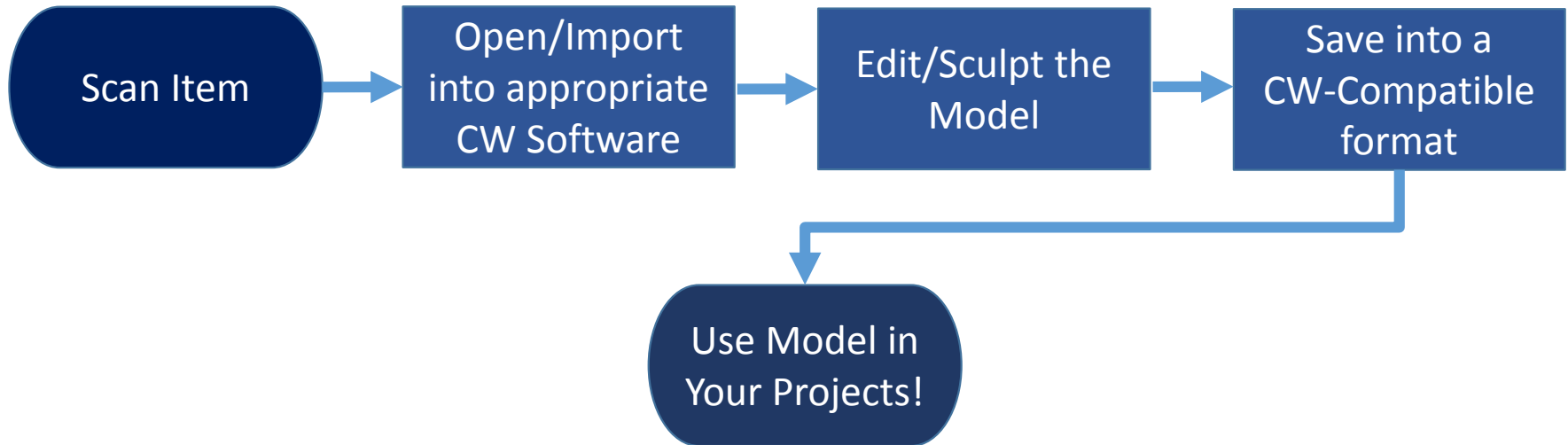
carvebuddy.com

Session Overview:

- **Common Digital Scanning Methods**
 - Probe Scanning
 - Photogrammetry
 - Laser Scanning
- **Importing and Editing Model Scans**
 - Probe Scan Conversion to Relief Models
 - Full-3D Conversion to Relief Models
 - Techniques to “finesse” Your Models
- **Q & A**

Session Overview:

Whatever your chosen scan method, the basic steps for model processing are similar...



I'll cover these steps in more detail during the presentation.

Scanning Methods:

Let's take a closer look at these three scanning methods...

1. Probe Scanning



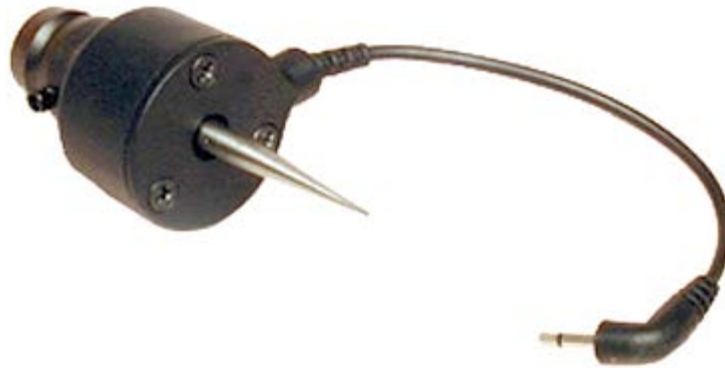
2. Photogrammetry



3. Laser Scanning



Probe Scanning:



Probe Scanning:

A touch probe is available for your CarveWright CNC and includes the Pattern Editor software.

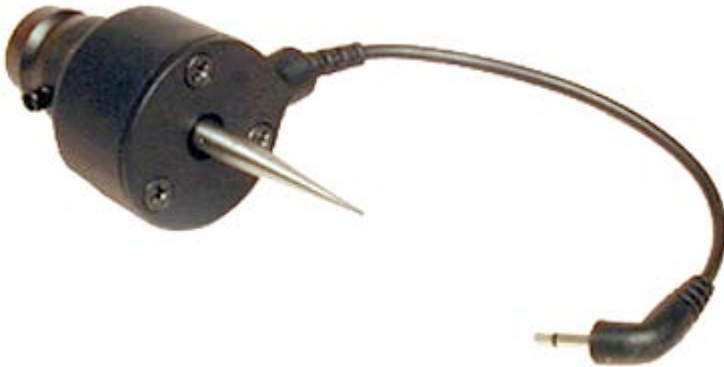


Scans to 1.25" depth

Scanning Probe Tutorials are posted at the CarveWright website in the Support Section.

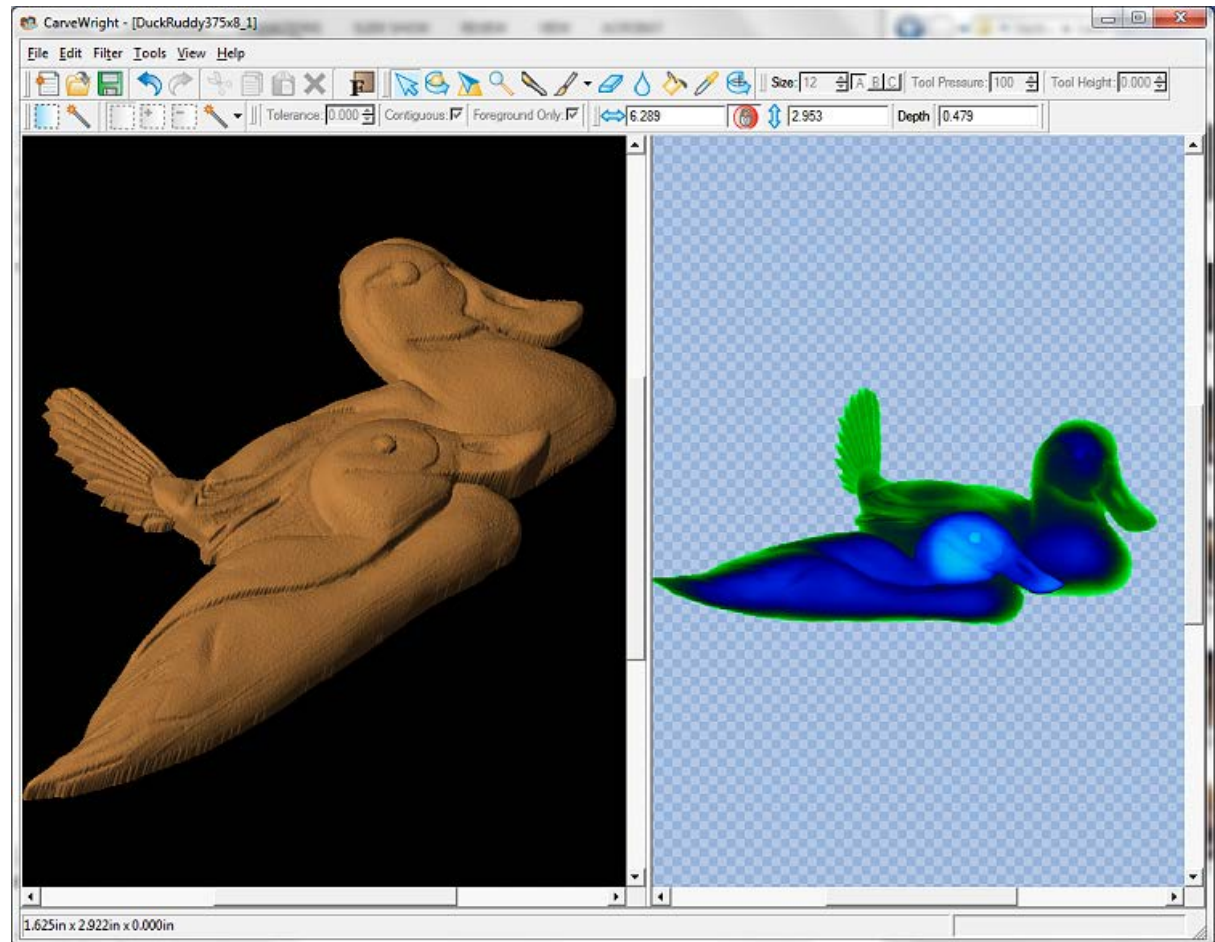
Probe Scanning:

A typical CNC touch probe follows the contours of an object in X, Y and Z axes...



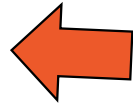
Probe Scanning:

...as the probe point travels over the object's contours, nooks and crannies, it records a digitized version of the item.



Probe Scanning:

Since touch probes make physical contact while scanning, use caution when scanning valuable objects. The probe could leave marks or scratches. Soft tips are available, but may sacrifice some resolution detail when used.



Scanning probe tips help to protect more delicate scanning surfaces from scratching and gouging. Use a protective tip when scanning surfaces such as soft plaster, shiny metal or antiques.

Probe Scanning:

Many of my own models were probe-scanned. I manually sculpted relief models with Sculpey oven-bake clay, then coated them with thin CA glue to provide a “hard shell” before scanning.

Making clay models for scanning can be a fun way to create digital models for CNC machining!



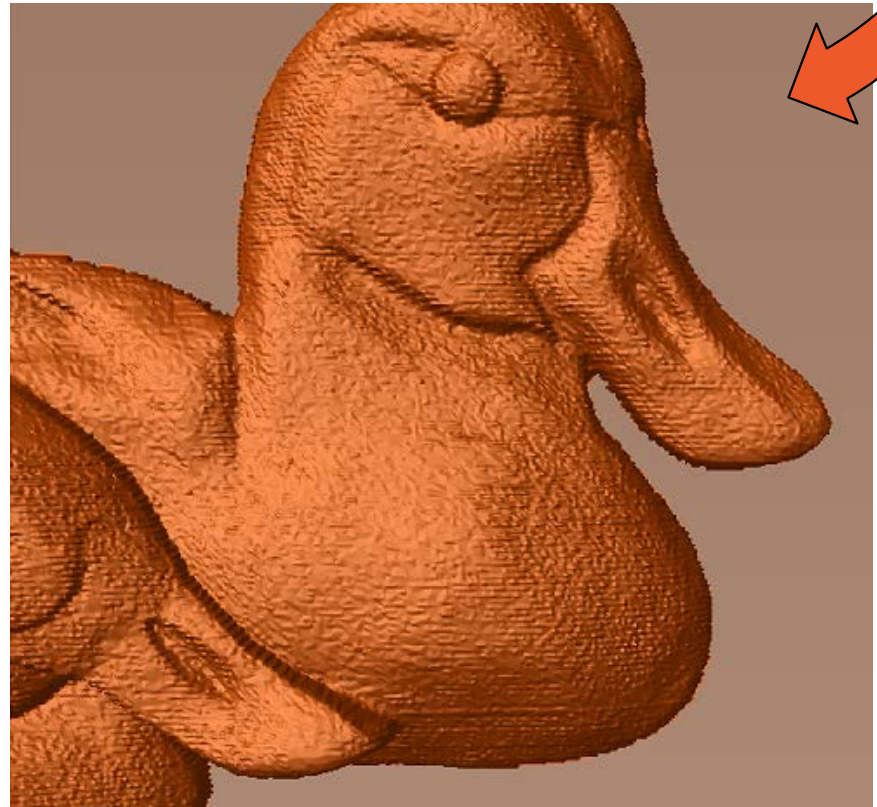
Probe Scanning:

Touch-probe scanning will yield “lines and bumps” where the probe physically touches the object.

This is normal, and can be smoothed or blurred using the Pattern Editor.

...or...

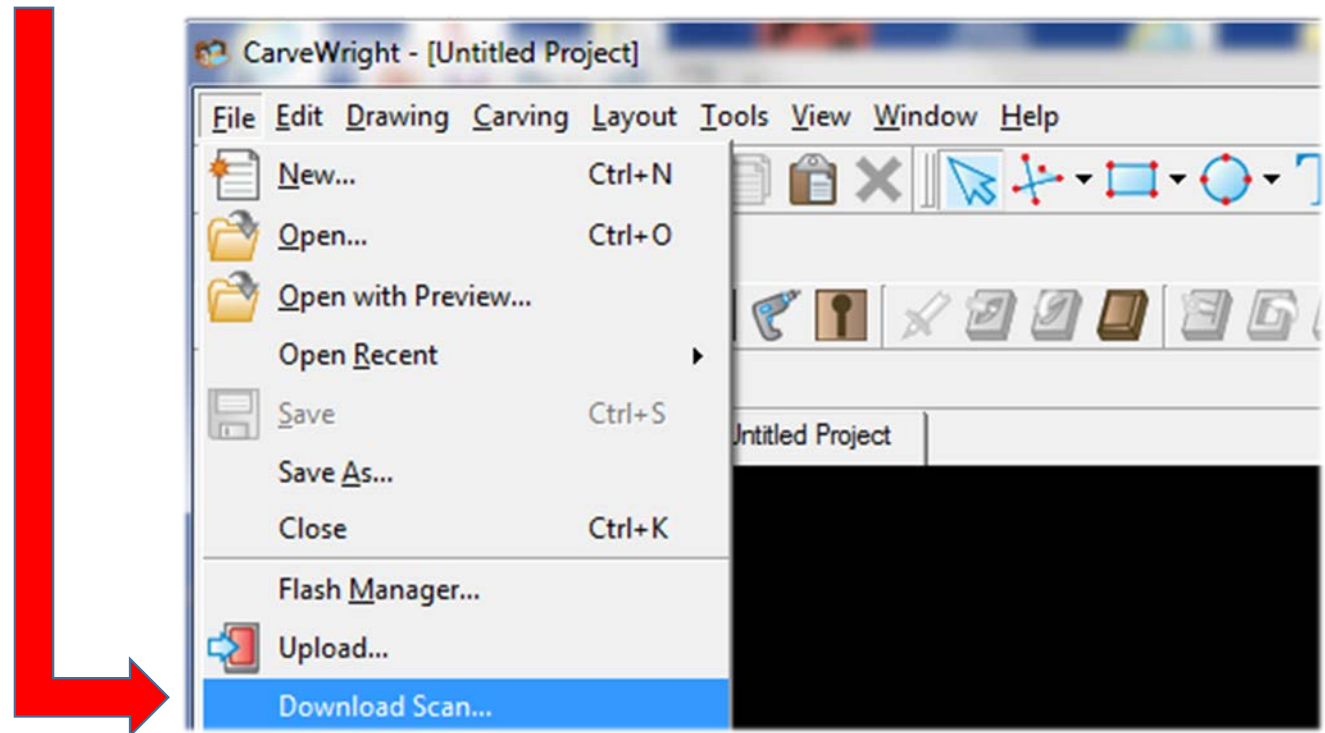
The scan can be smoothed and sculpted using the Pattern Sculptor.



Probe Scanning:

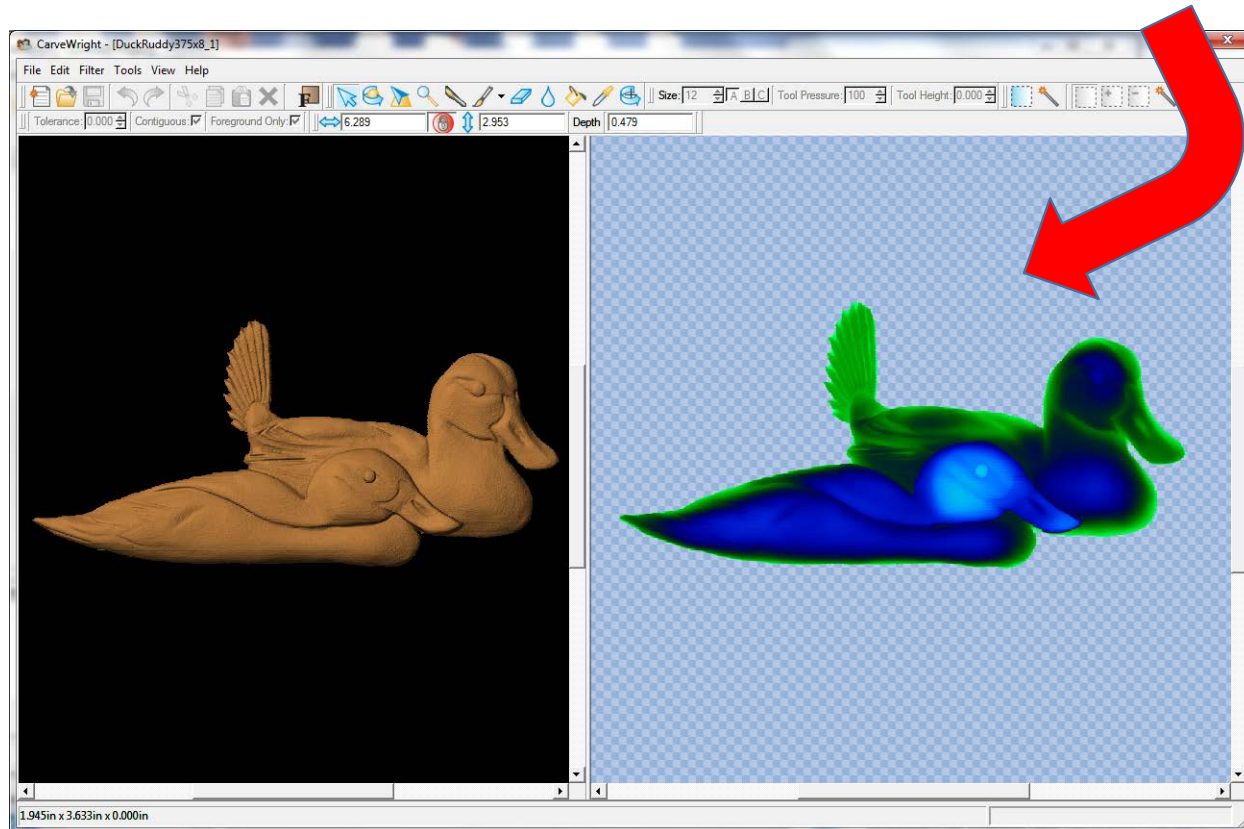
Touch-probe scans are saved on your Memory Card.

You will download the scans to either Pattern Editor or Sculptor via the “Download Scan” menu item in **Designer Basic** and/or **Designer Pro**.



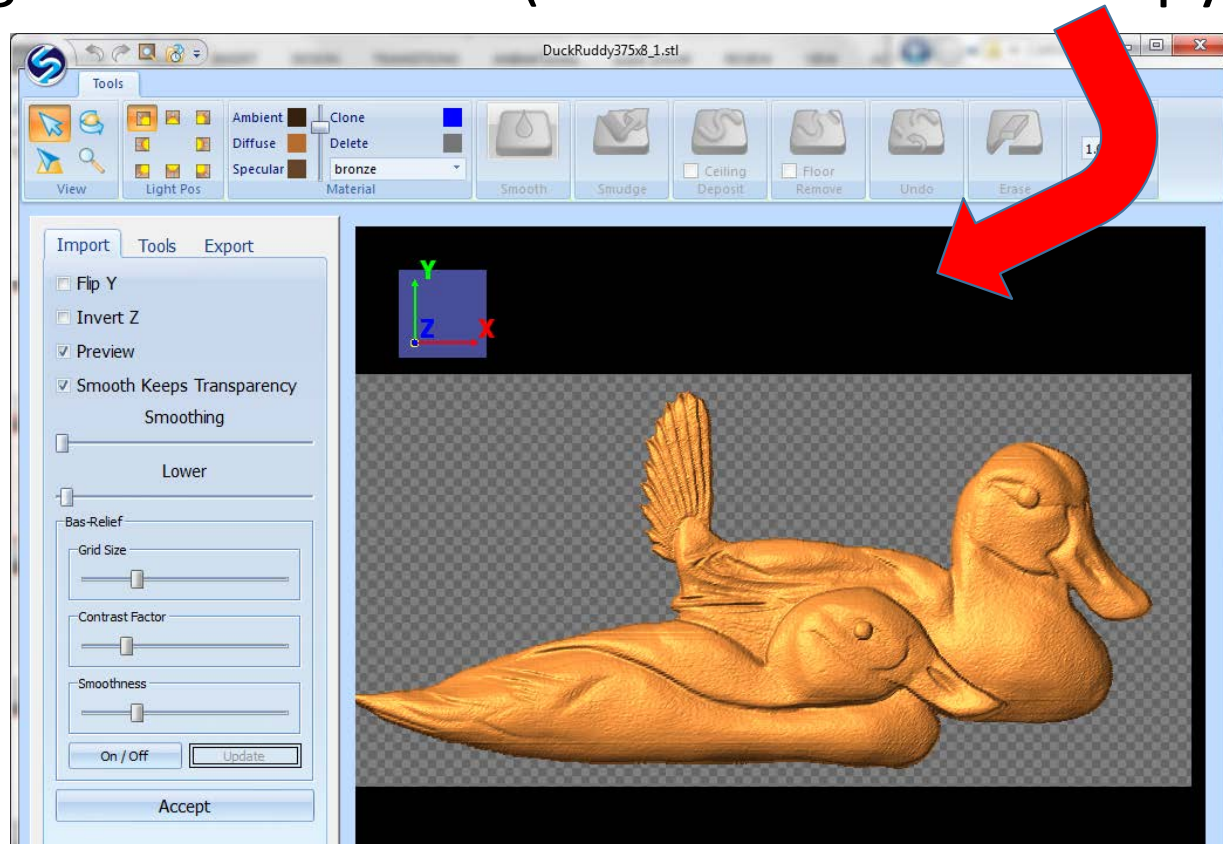
Probe Scanning:

If you use Designer Basic, your downloaded probe scans will automatically open in Pattern Editor for editing and saving as a PTN model (and as a MPW safe-copy).



Probe Scanning:

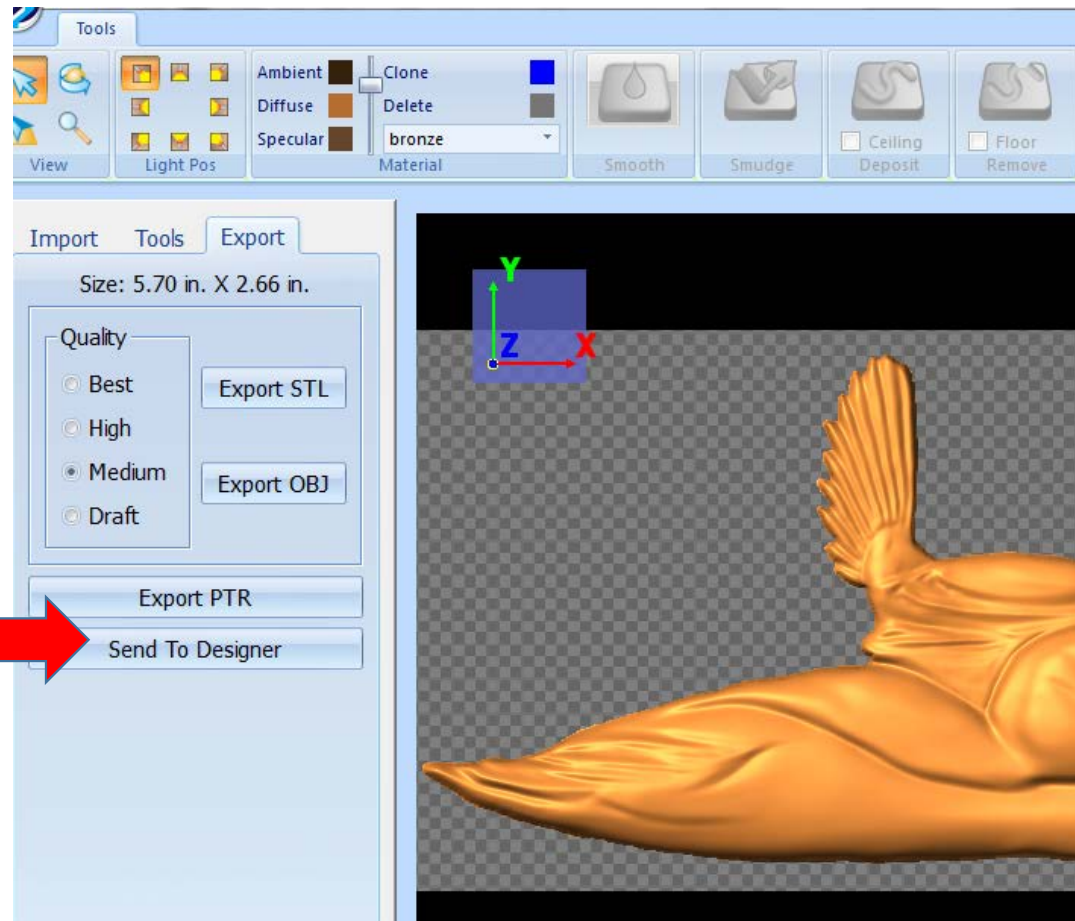
If you own Designer Pro and the Sculptor software, your probe scans will automatically open in Sculptor for editing and saving as a PTN model (and as a PTR safe-copy).



Probe Scanning:

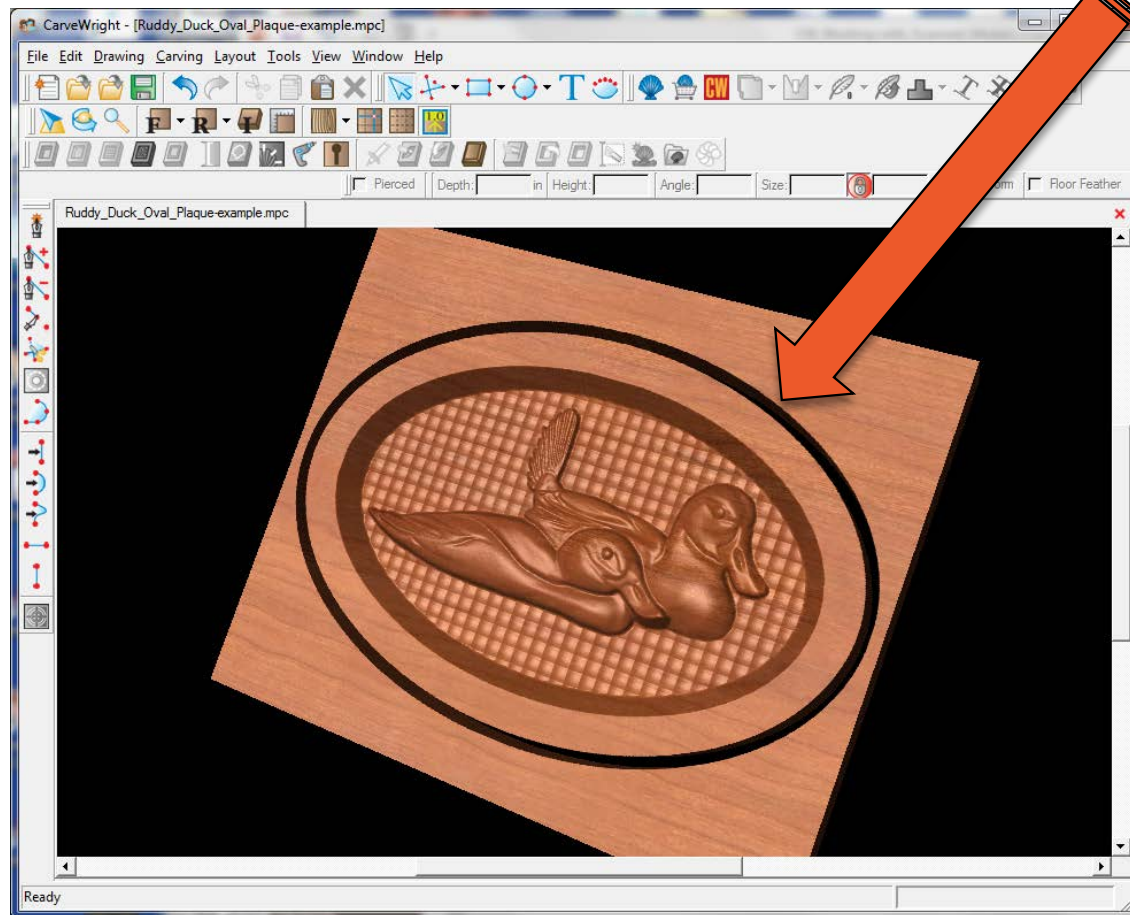
The Pattern Sculptor enables you to more finely “finesse” your scans than the standard Pattern Editor.

If you own Designer Pro and the Sculptor software, your sculpted scans can be sent to Designer as a PTN model by clicking the “Send To Designer” button, or exported as STL, OBJ or PTR.



Probe Scanning:

After the probe-digitized scan is edited and saved as a PTN model, it can be used in your Designer layouts.



Probe Scanning:

- Editing a scan using Pattern Editor is typically focused on smoothing globally and/or using the Blur pen to help minimize scan lines and bumps.
- Editing a scan using Pattern Sculptor is a more intuitive process. The Sculpting Tools enable a better targeted “finessing” of your scans/models to yield an often superior result.

Probe Scanning:

Live Demo of Pattern Editor
and
Pattern Sculptor goes here

("Ruddy Ducks" files)



Probe Scanning:

Misc. Comments and Tips...

- Probe scanning in X,Y,Z axes yields a relief model automatically, so the scan may not require much in the way of height editing (if at all)
- “Clean-up” of a probe scan is a fairly straightforward process (smoothing and/or light sculpting).
- A Pen Tablet can increase sculpting efficiency and control
- Oven-bake clay is a good medium for manually sculpting your own objects for probe scanning
- Probe scanning usually requires the least amount of “technical” effort from a scan-to-useable CNC model

Summary – Probe Scanning:

Probe Scanning

Advantages:

- Reasonably Low Cost
- Least “technical” method for creating relief models
- Easily create your own library of PTN models

Disadvantages:

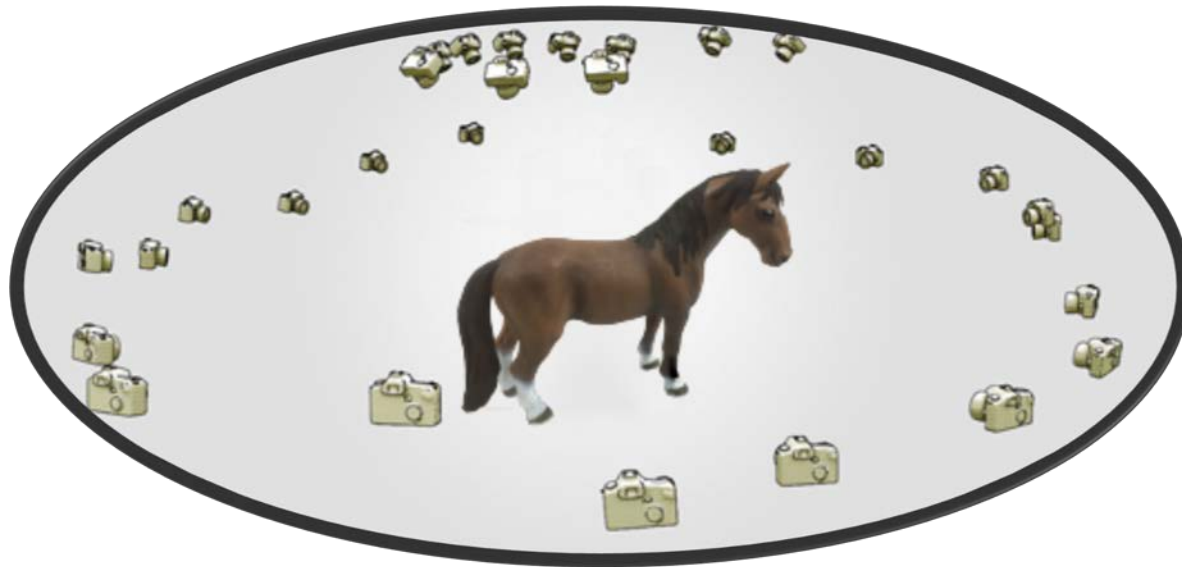
- Probe scans can take about as long as raster carving
- Limited object size and Z axis depth
- Physical contact is required and could damage sensitive items

Probe Scanning:

**Do you have any questions about
Probe Scanning?**

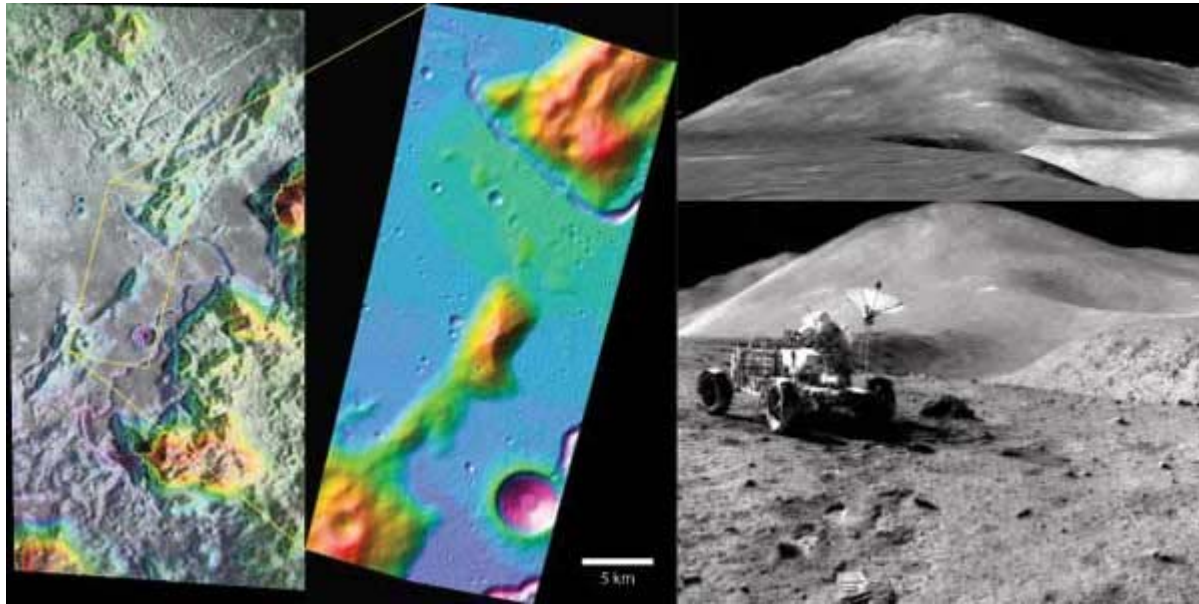


Photogrammetry:



Photogrammetry:

Photogrammetry technology has been used for creating dimensional topographic maps of Earth and other celestial bodies.



We can use the same technology to create models for carving with our CarveWright CNC machines.

Photogrammetry:

We can make our own photogrammetric 3D models using free software...



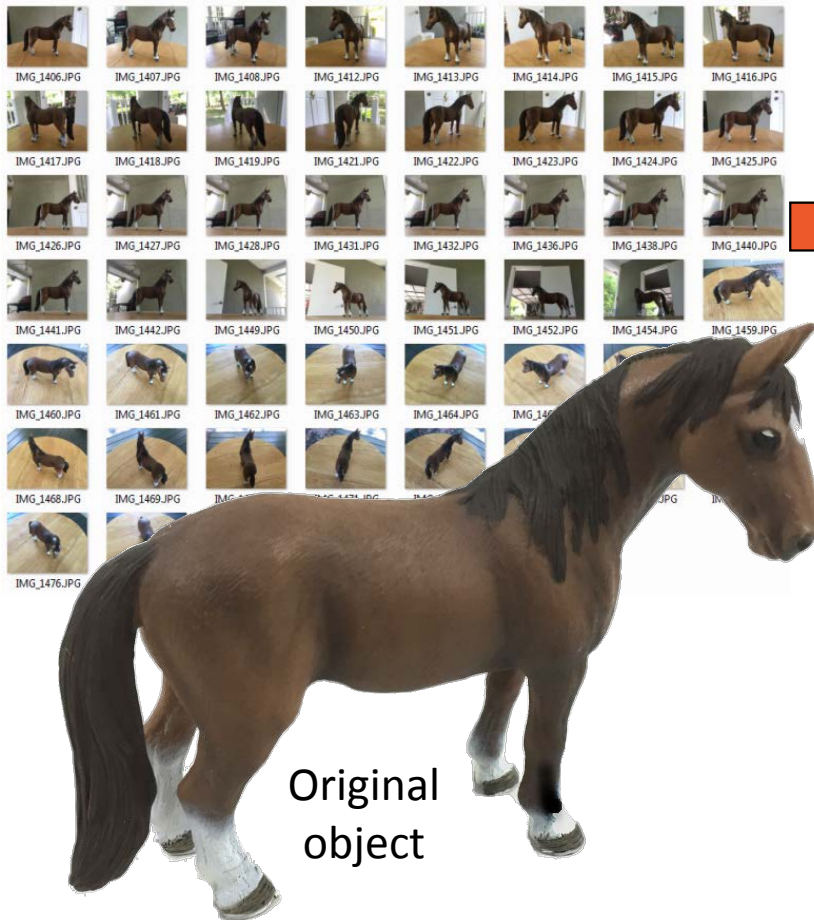
Photogrammetry:

Photogrammetry procedure using 123D Catch:

- Take a series of 30 to 70 overlapping photos all around the object (top, middle, and base areas)
- Upload the photos to your free 123D account
- Wait for cloud computing to create the 3D model
- Check resolution and change it if desired, before deleting any unwanted areas in the 123D Catch software
- Save the model as OBJ from the desktop application or download either OBJ or STL from your account's "cloud" application

Photogrammetry:

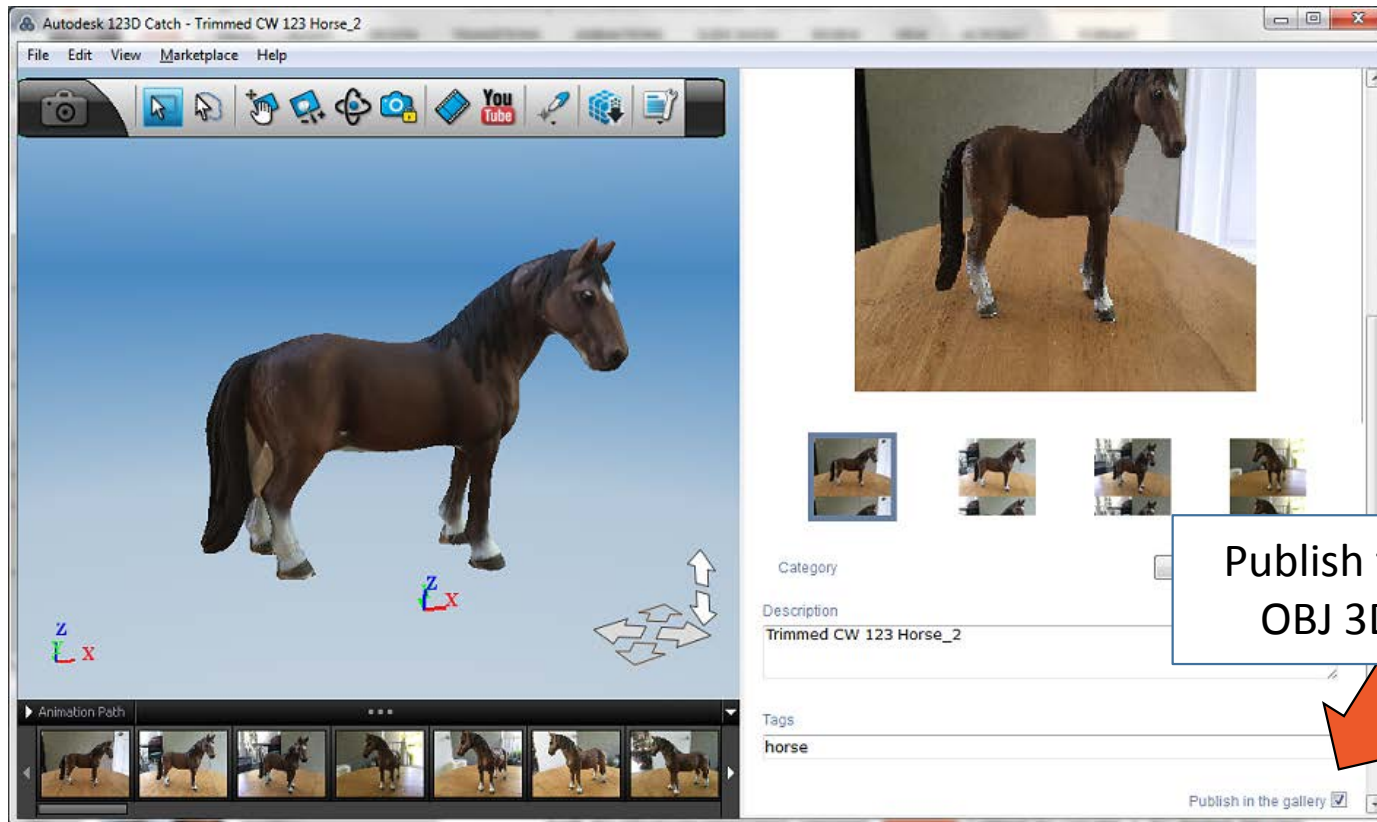
Here's an example of a full 3D model created from overlapping photographs of a stationary object...



Photogrammetric version

Photogrammetry:

You can trim away any undesirable parts of the model in the 123D software, then publish it to your online gallery. This enables the creation of STL and OBJ models.

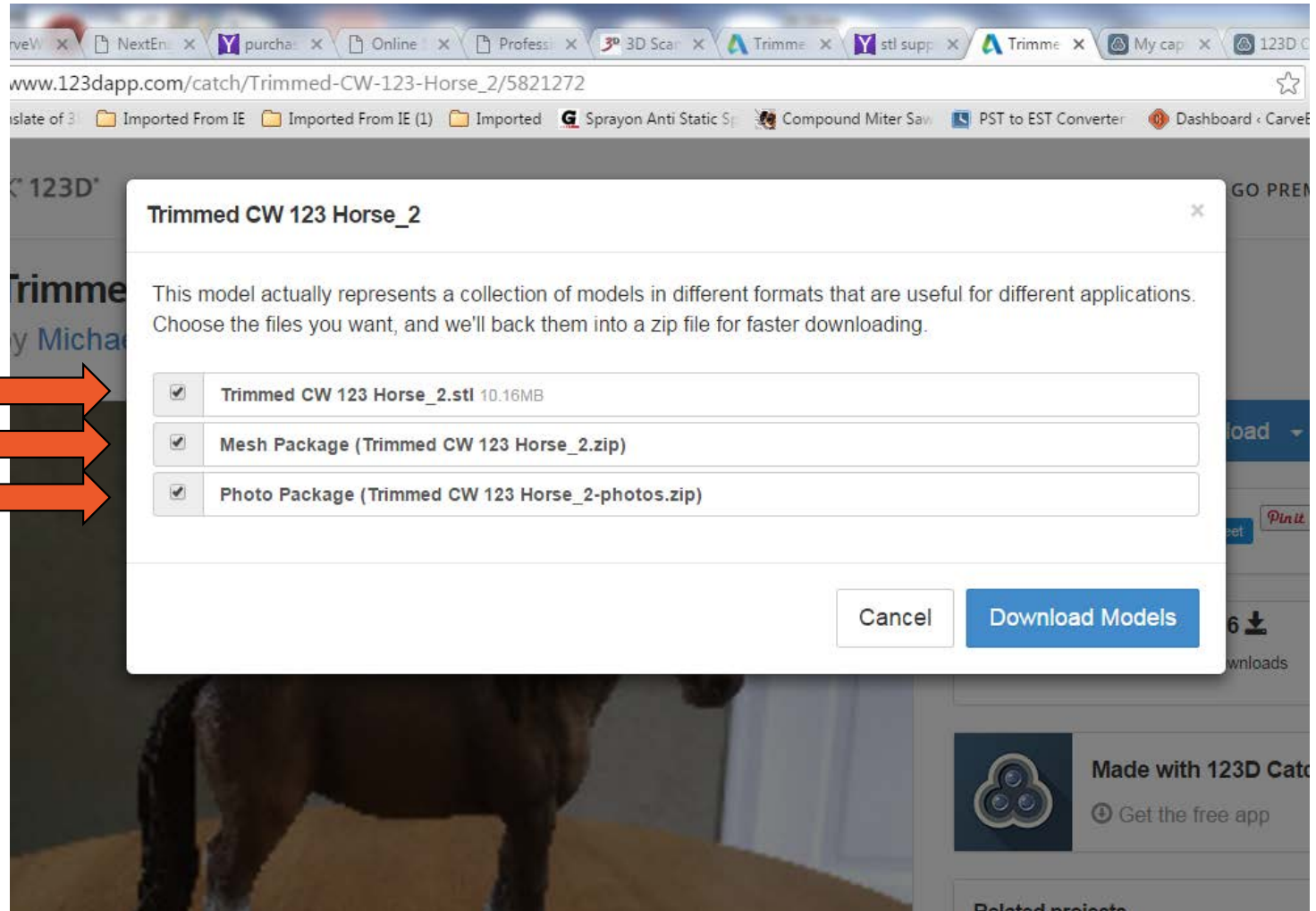


Publish to create STL and
OBJ 3D Relief Models

Photogrammetry:

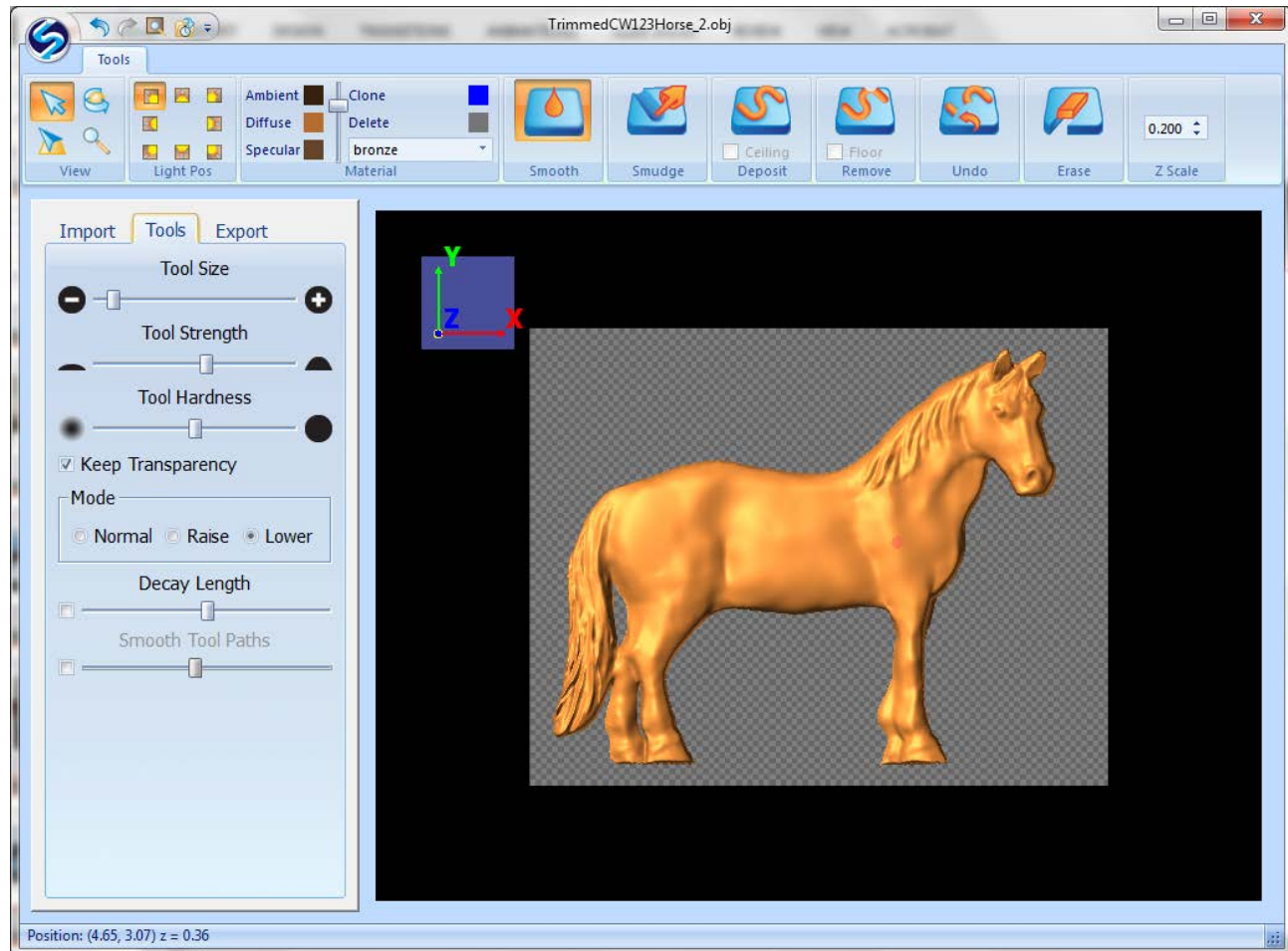
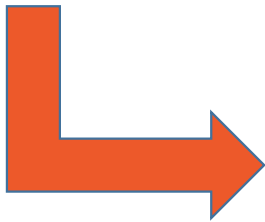
Download your 123D Model from your online account.

STL file →
OBJ file →
Photos only →



Photogrammetry:

Your downloaded 3D model can then be “squashed down” and edited using Sculptor’s tools to convert to a CNC relief model.



Photogrammetry:

Live Demo of converting a Full-3D Model
Using Pattern Sculptor goes here

("Trimmed CW 123 Horse" files)



Photogrammetry:

Misc. Comments and Tips...

- Take photos in good, consistent light and do NOT use a flash.
- Place the object on a “busy” surface. This helps the stitching algorithm.
- Fill the photo frame as much as possible with the entire object from all photo angles.
- Don’t move the object at all when taking photos – only **you** and **your camera** move around the object.
- You can use the free program MeshMixer to make a “solid model” if your photogrammetric model has any holes in it.

Summary – Photogrammetry:

Photogrammetry Scanning

Advantages:

- Zero Cost to create a full-3D model (free)
- Reasonably good results in many cases
- Can generate models from very large objects such as buildings (resolution detail is low for large objects)

Disadvantages:

- Limited Resolution Control (Mobile, Standard, Maximum)
- Photos must be taken carefully in fairly ideal lighting
- Shiny or transparent objects must be coated
- Internet connection required to access all functions
- The 123D interface and procedures can be confusing

Photogrammetry:

**Do you have any questions about
Photogrammetry Scanning?**



Laser Scanning:



Laser Scanning:

Laser scanners can range in price from \$380 to \$1250 or more for higher quality scanners.

The one I use is the NextEngine scanner and can be purchased for about \$4000 including their enhanced scanning software.

ScanStudio ProScan

- 2X Faster Scan Speed
- Large Area
- 4X Higher Density

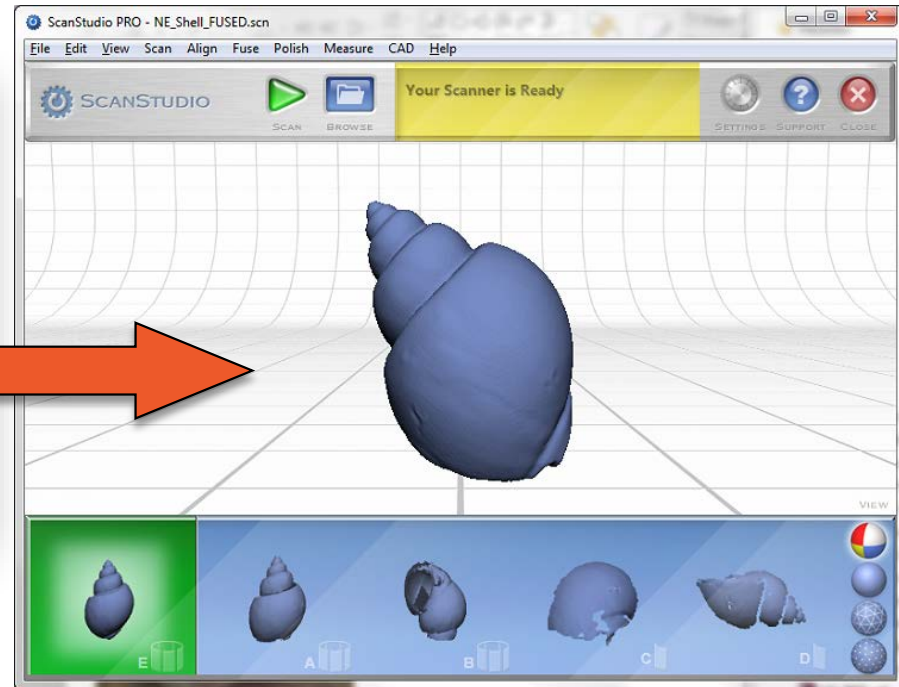


Laser Scanning:

Laser beams projected onto the contours of an object records a digitized version of the item.



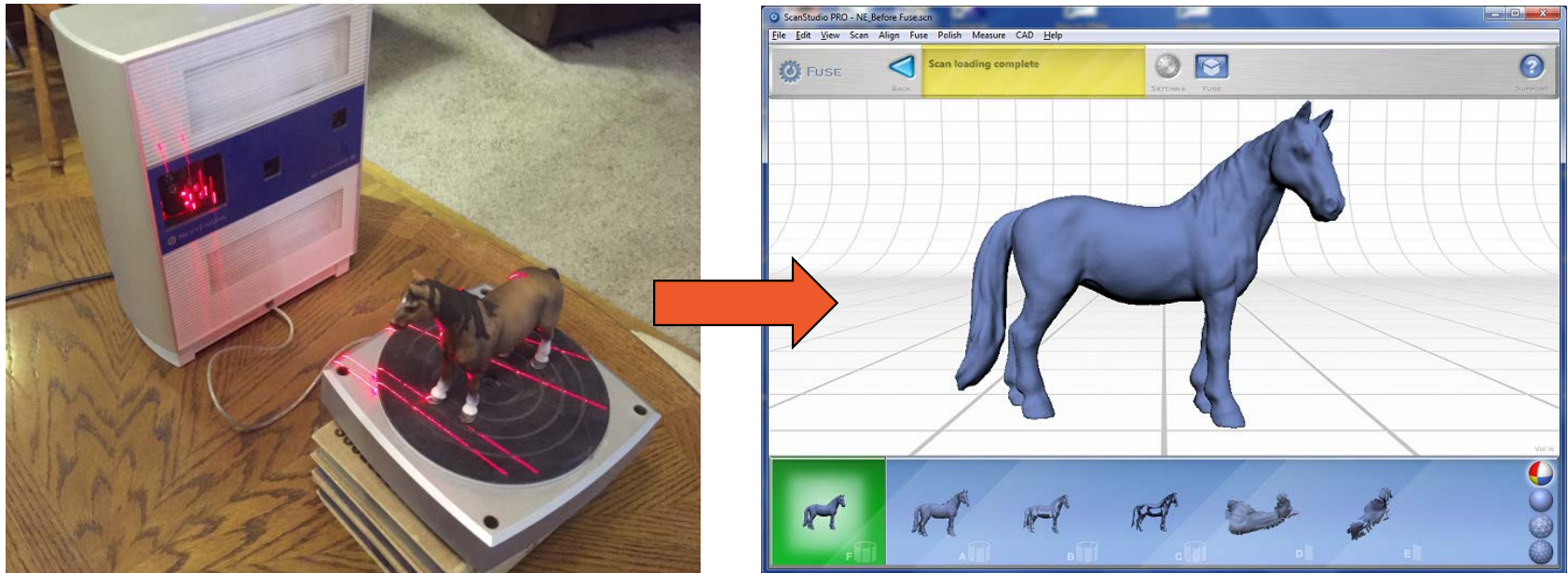
Laser-scanning a shell



The laser data is recorded in software

Laser Scanning:

Laser scanners can produce accurate 3D model representations of objects. Museums use laser technology for digital archiving of artifacts.



We can use the same technology to create models for carving with our CNC machines.

Laser Scanning:

Macro = 0.005" accuracy

4" x 5" field of view

- Place object 5" to 9" away

Wide = 0.015" accuracy

10" x 13" field of view

- Place object 15" to 22" away

Extended = 0.015"+ accuracy

17" x 22" field of view

- Available with HD PRO

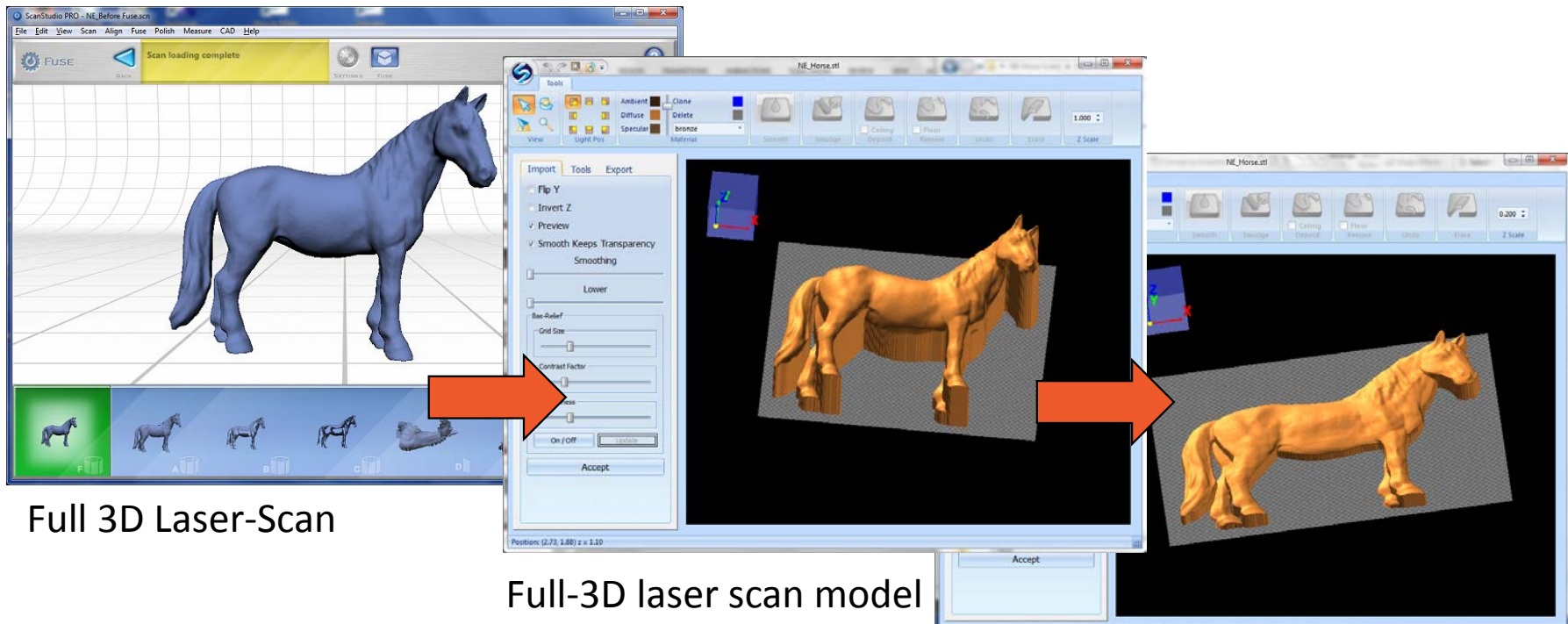
- Place object 15" to 30" away



NextEngine Scan Setup Window

Laser Scanning:

The laser-scanned 3D model is modified (squished down) and edited in Sculptor for use as a relief model for CNC machining.



Full 3D Laser-Scan

Full-3D laser scan model
imported into Sculptor

“Squished” Embossed Relief
ready for sculpting

Laser Scanning:

Live Display of Laser Scan Examples
goes here

(“NE Horse Scans” file...and “Cherub” –
show Cherub reference photos and scan)



Laser Scanning:

Misc. Comments and Tips...

- Use Talcum Powder, Foot Powder Spray, white hair spray or Magnaflux Spotcheck SKD-S2 Developer to coat shiny items before scanning.
- Turn off “Texture Capture” to speed up scanning times.
- “Disrupt” the surface of symmetrical objects with small items placed onto the object (example: pieces of tape, dots of clay). This will help the alignment algorithm when stitching scanned sections.



Summary – Laser Scanning:

Laser Scanning

Advantages:

- Can yield very accurate models (depends on scanner)
- Does not require physical contact with object
- Can be faster than probe scanning
- Scans in full 3D if desired

Disadvantages:

- Can be higher in cost than other scan methods
- Limited “practical size” for scanning objects
- Laser needs “line of sight” (deep recesses can be missed)
- Shiny or transparent objects must be coated

Laser Scanning:

**Do you have any questions about
Laser Scanning?**



Conclusion:

In this presentation, we've looked at three scanning methods...

- Probe Scanning
- Photogrammetry
- Laser Scanning

...and techniques for importing and editing your model scans.

• Do you have any final questions?

Thank you, and Happy Carving!

Michael Tyler

Michael Tyler



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