Provel Carve 2.0 User's Guide

Purpose
Provel Carve is a tool to create and send motion files to a Provel Carver. It allows the user to specify carve parameters and base options to optimize the quality and usability of carved models.

File Types
Provel Carve 2.0 supports AOP, OBJ, and STL file types.

AOP
AOP files are industry specific 3D shape files widely used in Orthotic and Prosthetic CAD applications. AOP files can be used for essentially cylindrical volumes. They do not allow over center points and therefore can not be used for AFO's. AOP files are created with an established spatial orientation. AOP files will be in millimeters.

OBJ
OBJ files are universally accepted object definition files that contain 3D geometry. They can be used to describe any 3D shape. OBJ files tend to load faster than STL files. They have no implicit spatial orientation. Units should be expressed in millimeters.

STL
STL files were developed for stereolithography and are supported by many CAD software packages. They have no implicit spatial orientation. Units should be expressed in millimeters.

Computer requirements
Provel Carve 2.0 is supported on Windows and Mac OSX ver 10.4 or newer.

Installation
Windows
Download/Save Provel Carve File
Right click on the Prove Carve File and select "Extract All"
Select destination into which program will extract.
Example: "C:\users\Provel\Desktop\ProvelCarve2"
Click the "Extract" button
Open location to which files were extracted and double-click on the "Provel Carve" icon.

Mac
Download/Save the Provel Carve File Double click on the Provel Carve File Double-click on the "Provel Carve" icon.

Connecting to the Carver

Carver Preferences

Upon initially opening Provel Carve 2, the Preferences window will open. In Preferences select your connection type and units of measure.

Connection

Select Serial and then select the port used under the pull down menu.

Units

Select Inches or Millimeters as units.

Baud Rate

Use 38400, the highest speed. You may try a slower baud rate if you are connecting with a long cable or have difficulty transmitting files. Set the baud rate to match in the carver using Setup on the control panel.

If a port selection has been established, and the carver is connected to the computer, the carver will connect automatically to Provel Carve 2.

If the cable connection occurs after opening Provel Carve 2, the connection must be set manually by pressing the Connect button.

If successfully connected, you will see Carver Ready and a green dot illuminated in the top portion of the window.
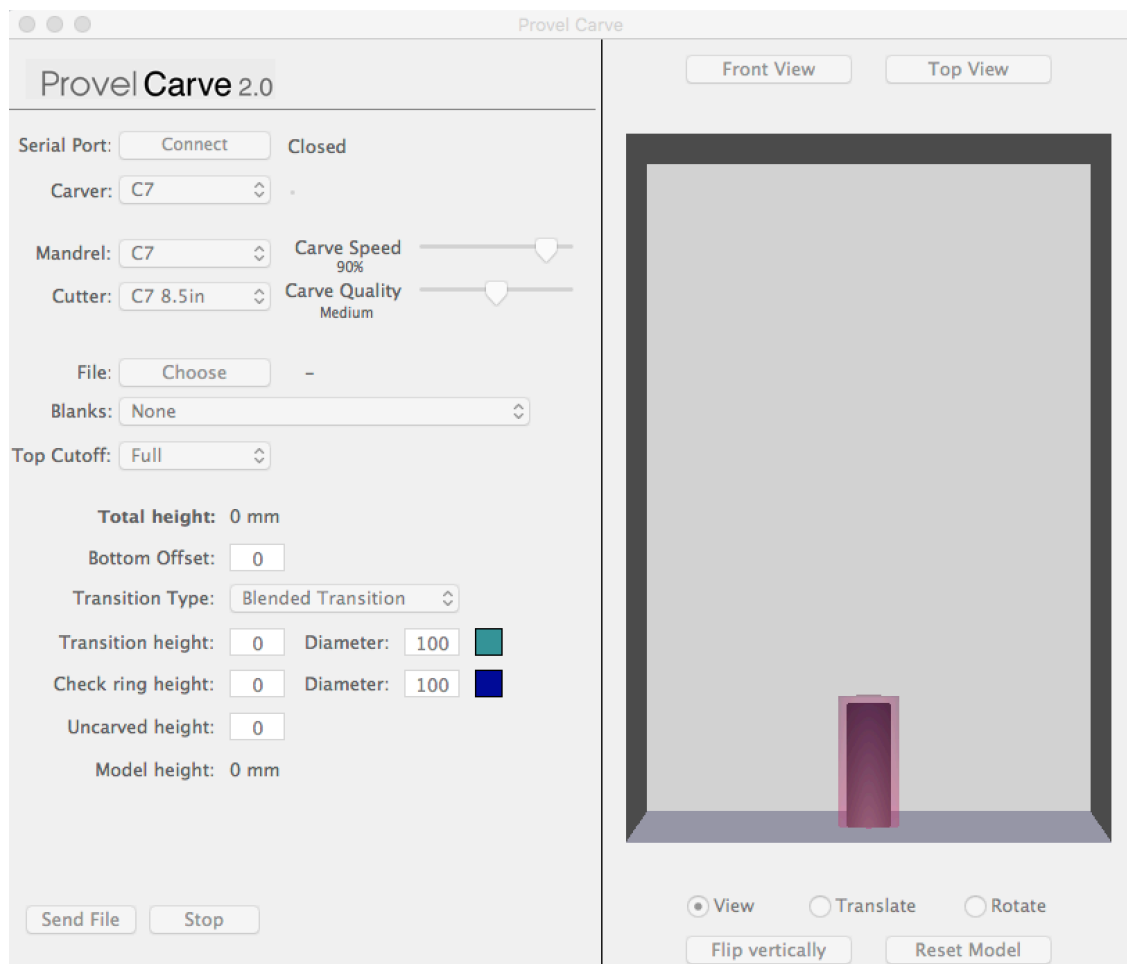
Carver Parameters

Carver Type
Shows the type of carver connected. When the carver is connected, this will be set automatically.

Mandrel
Select the mandrel to be used. This governs the size of the mandrel protection zone. Failure to select the correct mandrel may allow the cutter to hit the mandrel.

Cutter
Select the cutter installed. Use the long cutter only when carving an AFO to reach over-center dimensions.

Carve Quality
The carve quality slider selects the carve resolution in terms of carve slices per inch of length. Higher quality will result in finer overall pitch and longer carve time.

Carve Speed
The carve speed slider controls cutoff and carve speed from 10% to 100%.

Choosing A File
To load the file of your model, select the "Choose" button. Navigate to the the desired file and select "Open."

You may also click and drag the file directly into model view window or over the Provel Carve icon to load it.

The file will be rendered in the view window and you will be able to manipulate the height options, view, and model location controls.
Next, select the blank size using the "Blanks" pull-down menu.
Three different types of blanks are supported: Cylindrical, Elliptical, and Rectangular. You can choose from an assortment of preloaded blanks or you can create your own by selecting "Edit" at the bottom of the list.

Blank Editor
Edit mode allows you to edit, remove, or create a new blank.
You can restore the original preloaded blanks by selecting the "Restore Defaults" button.
Clicking the Add New button will take you to the "Add Blank" window.
In the Name field, type in the desired name of the new blank.
Choose the blank type from the pull-down menu. (Cylindrical, Elliptical, or Rectangular)
Enter the blank dimensions in the appropriate fields and click Save.
The new blank will now be listed among the other blanks in the pull down menu.
Blank dimensions are listed within the name of the blank.

Carve Options

Top Cutoff

The Cutoff pull-down menu offers three types of cutoffs to begin carving:

None
The carver will advance to the top of the model and begin the carve.

Partial
The cutter will advance far enough into the blank to begin carving the model, but leave a portion of material to prevent cutting off the top of the blank.

Full
The cutter will advance past centerline and cut-off any blank material present above the top of the model.

Viewing and Positioning the model

There are two view mode buttons: Front View and Top View. These buttons are located above the model view window.

The view and position controls are located below the model view window and are activated after file selection.
View: Allows manipulation of the model view by clicking and dragging within the model view window.

In Translate and Rotate modes, holding the Shift key while dragging within the model window will manipulate the view.

Translate: With Translate selected, the model can be moved laterally within the blank without disturbing rotational orientation.

Rotate: With Rotate selected, clicking and dragging within the view window allows rotation of the model within the blank. Switching between view modes will help in aligning the model. The model will free rotate (not on a particular axis) in the direction of mouse movement.

Flip Vertically button reverses the vertical orientation of the model.
Reset Model button will reset the model to the original orientation prior to altering the position.

Model Manipulation

Base features can be added to the bottom of the model. To input values you can either manually type the value in the text box or you can click within the text box and then click in the model view window to visually adjust heights.

Total Height

The total height of all the carving features selected by the user. It starts with the model itself, adds the uncarved height, check ring height, transition height, and subtracts any part of the model cut off with the bottom offset feature. Although a sum, it appears at the top of the feature stack to represent the total height at the top of the carve path.

Bottom Offset

This optional feature selects the horizontal slice of the model at which the appended transition will begin. Despite the model still rendering below the bottom offset red and yellow indication line, all model parts below this line will not carve and all parts above the

line will carve. Bottom offset is useful for preventing undercutting with hollow shapes that do not present a perfectly horizontal bottom or that are rotated off-axis within the carving blank. This feature is represented by a yellow line with a red stripe.

Transition Type
This refers to the base area directly under the model is used to seamlessly blend the model to other base features. Transitions are represented in green.

Transition Height
The transition allows extending the carved model for thermoforming and trim line purposes. Transition height is user selectable.

Blended Transition
The blended transition smoothly progresses from the bottom (or offset) slice to the check ring diameter.

Cylindrical Transition
This transition applies a cylinder of user selectable height between the model and check ring. The diameter can be manually set by the user.

Extend Model Slice Transition
This transition generates an extended surface downward from the model to the check ring with a consistent cross-section that matches the bottom (or offset) model slice.

Check Ring
This optional but recommended feature provides a means for checking the physical accuracy of the carved positive. After carving, the dimensions may be verified with calipers or a flexible tape measure. This feature is represented in Blue.

Check Ring Diameter
The diameter of the check ring may also be adjusted; the use of consistent, round numbers is recommended for reliable comparison and verification.

Uncarved Height
The uncarved height adjustment allows the model and any transitions or check rings within a blank to be raised. This feature is useful for mandrel clearance as well as anticipating the reuse of a carved blank (carving a smaller model at a lower uncarved height). Note: This feature is not rendered in the model window.

Model Height
This is the height of the model only.

Saving Your Settings
To save your current file settings as a new default, select "Save Settings as Default" within the file menu. You can restore defaults by selecting "Restore Default Settings."

Tool Tips
Tips are provided to briefly explain the purpose most available features. By hovering the mouse over the top of a pull-down menu or a text box, a small tool tip window will open, providing a description of that feature.

Carving Considerations

Blank Density

Higher density blanks will need to be carved slower, and lower density blanks may need to be carved faster to prevent tearing. If your model has large contour changes, a slower, higher quality carve is desirable.

File Differences

OBJ's and STL's do not implicitly specify units, while AOP's are always based on millimeters. The carver expects that every file loaded is defined in millimeters. Make sure when creating OBJs and STLs to specify units in millimeters. This does not pertain to the units of measure preferences used in Provel Carve which are there purely for user convenience.

Model Orientation

The carver will not carve any part of the model falling outside the selected blank.

It is important to center the model in the blank to avoid mandrel interference. It will also prevent excessive movement of the cutter allowing the carver to do less work.

Orient the model within the blank so the purple mandrel is hidden. If it is shown protruding through the model, the carve path will be automatically altered to avoid cutter contact with the mandrel.

To reduce carve time and ensure a good resolution, avoid orienting the model so planar surfaces are parallel to the cutter. This is generally more important when carving AFOs.

Thermoforming

Refer to optimal draw lengths for the size of preform to be used. Transitions and base features can be added to achieve this value. The diameter of the check ring needs to be within the diameter of the intended preform.

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