

Finger Joints Script

[V. 2.1] (Tested by the author on CamBam version 0.9.8P (beta-2) only)

Purpose

This script for CamBam is intended to assist in the production of woodworking finger joints using a gantry type flatbed router, where the timber is oriented in the vertical direction and where the 'width' of the timber can align with the X or Y direction.



Installation

The zip file should be extracted in your CamBam 'scripts' folder. It will create a sub folder there called 'Finger_Joint_Images' and will populate this folder with the included images for the user interface.

The Output

The geometry and machining operations are populated in CamBam by the script, some options such as 'Post Processor' must be entered by the user.

The output is spread across three layers in CamBam, 'StockItemA', 'StockItemB', 'Comments'.

The stock item layers represent each piece of the stock item into which the joints shall be cut, the comments layer shows the chosen parameters and provides information for future use of the saved file.

Two CamBam 'Parts' are created with a Pocket machining operation in each. 'StockItem1 Part' will always contains the actual Stock Item 1 whereas the layers can contain either, depending upon the 'Swap Stock' check box.

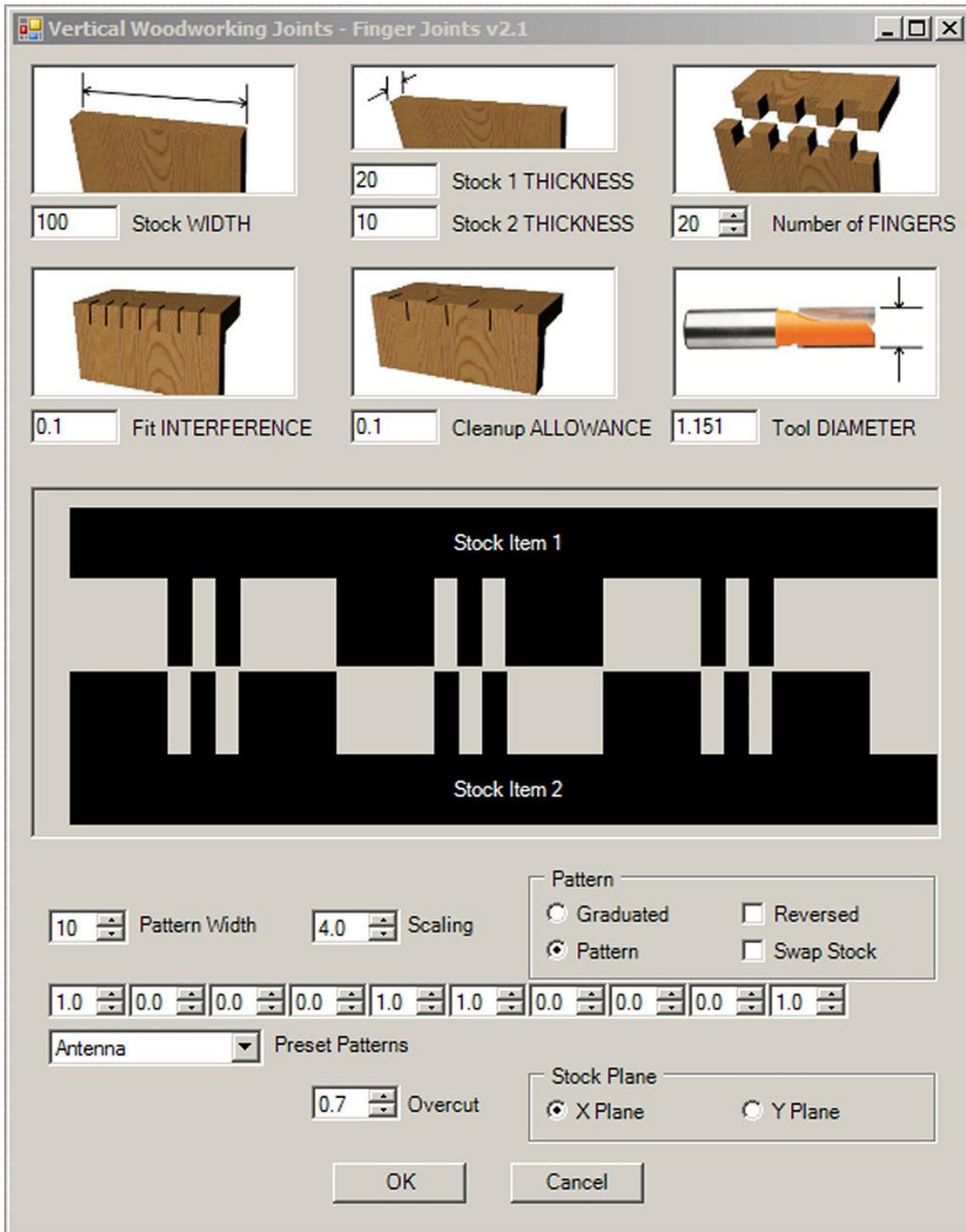
In Use

Within CamBam each layer can be set to 'Hide' or 'Show' so normally the Comments layer should be set to 'Hide'. In a similar fashion the two Stock Item Parts can be set to 'Enabled = True' or 'Enabled = False'

As there are two Parts created, each one can have it's own stock size, this allows the use of stock items with different thickness. To produce Toolpaths and G-code, each Part should be enabled one at a time.

Obviously if you have your own preferred method then you can use that.

User Interface



Note: When values are entered into the text boxes you MUST press < Enter > on the keyboard before they are accepted.

The fields are:

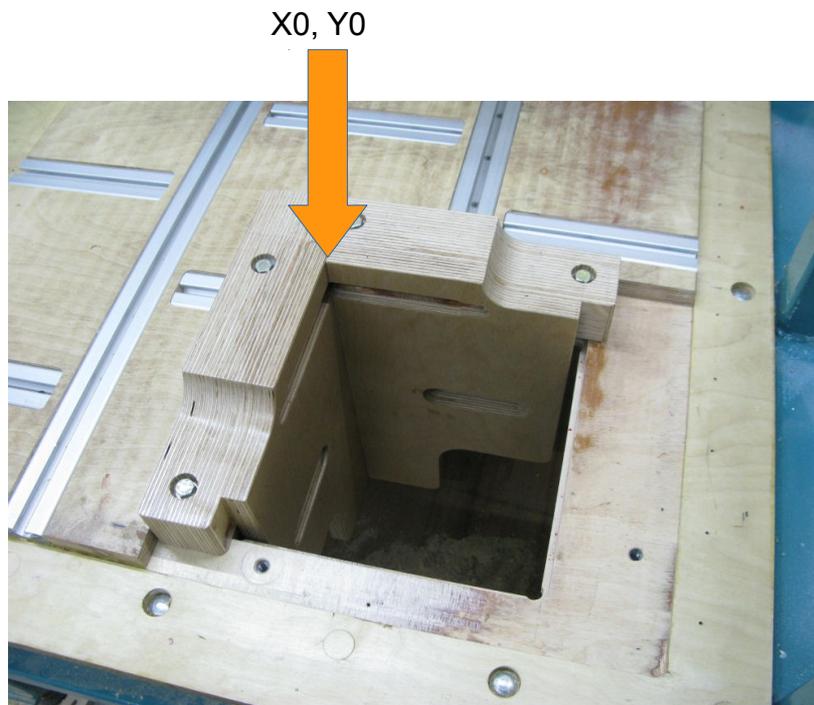
- **Stock WIDTH:** width of the timber stock material being used for the joint.
- **Stock 1 THICKNESS:** thickness of the timber stock material 1 being used for the joint.
- **Stock 2 THICKNESS:** thickness of the timber stock material 2 being used for the joint.
- **Number of FINGERS:** number of fingers required for the finished joint.
- **Fit INTERFERENCE:** the gap to leave between fingers to allow assembly, too tight and the joints won't fit together. This value is entered into the Pocket machining operation as a 'Roughing Clearance'.
Roughing Clearance = (Fit Interference / 2) because it is shared across two fingers.
- **Cleanup ALLOWANCE:** the extra material left protruding after the joint has been assembled, to allow clean up of the external surfaces of the stock material. This value is entered into the Pocket machining operation as an addition to the Z cut depth.
Target Depth = (Stock Thickness + Cleanup ALLOWANCE)
- **Tool DIAMETER:** the diameter of the cutting tool to be used for cutting the joints.
The maximum tool diameter possible is calculated by the script so that;
Tool Diameter = (Width of Smallest Finger – (2 * Fit INTERFERENCE))

The best way to use this is to enter your desired tool diameter into the box, if the script calculates that the diameter is too large it will offer a value that indicates the largest tool diameter possible. You should then select your nearest size tool that is the same as or below the offered diameter.

Important: it should be noted that the value shown will not be increased by the script, it will always show the smallest value. For example if your chosen parameters allow for a maximum tool diameter of 2.5 mm, then you subsequently change these parameters such that a 6 mm tool would work, then the script would still show 2.5 mm. You therefore need to keep entering a new value yourself to see if the script will accept it.

- **Overcut:** allows the cutter to overshoot the stock material thickness to ensure flat surfaces are produced across the full thickness of the stock material. The value is a multiple of tool diameter and ranges from 0.6 to 4.0 with 0.7 being default.
e.g. if the tool is 6 mm diameter and the Overcut parameter is set to 3.0 then the tool will overshoot the stock thickness by 18 mm on each side. This is useful when scrap material has been clamped either side of the cutting area to reduce or eliminate breakout of the stock material, there may be occasions when the tool is required to fully penetrate the scrap material to allow release of cutting waste.

- **Stock Plane:** allows timber stock to be aligned with it's width in the X or Y axis of the cnc machine. Selecting the Y plane will rotate the stock 90 degrees left so that the X0, Y0 work coordinate will always be in the same position, as shown in the picture below.



- **Scaling:** the script does not use discrete measurements for finger widths, all values are calculated as relative widths that sum to the 'Stock WIDTH'. The Scaling value is therefore a ratio such that, Scaling value = (Width of widest finger / Width of narrowest finger)
- **Pattern – Graduated:** produces a linear graduated pattern from one side of the stock material to the other. Narrowest finger to widest finger with linear increasing finger widths in between.
- **Pattern – Reversed:** reverses the pattern across the width of the stock material. e.g. if the Graduated pattern was, narrowest to widest left to right, it would be reversed to, narrowest to widest right to left,
- **Pattern – Swap Stock:** swaps the finger pattern to the other piece of stock material. e.g. if 'stock material 1' started with a finger and 'stock material 2' started with a gap, this option would then make 'stock material 1' start with a gap and 'stock material 2' start with a finger.
- **Pattern – Pattern:** opens up the options to define patterns across a range of fingers from 2 to 10.
- **Pattern Width:** the number of fingers before the set pattern repeats. e.g. if the value is set to 4, the pattern will repeat after every 4th finger. Determines the number of 'Pattern Boxes' made visible.

- **Pattern Boxes 1 to 10:** shows a minimum of 2 boxes, (you can't have a 1 fingered joint). The values in these boxes can be set from 0 to 1 in increments of 0.1. These values equate to ratios of finger widths. e.g. 1.0 = widest finger, 0.0 = narrowest finger, 0.5 = a finger halfway between the two, etc. There is a distinct interaction with the **Scaling value**. e.g. with a scaling value of 1.0, there would be no difference in relative widths of the widest finger and the narrowest finger, therefore all fingers would be the same width. If scaling was changed to 2.0 then the widest finger might be 12 mm. the narrowest 6mm and a pattern box set to 0.5 would yield a finger of 9mm width.
- **Preset Patterns:** some patterns ready to use or just as a starting point for your own creations. Names were derived from the resultant shape of a line graph showing the widths of each finger plotted as height, just a bit of fun really.
- **The finger display window:** This is a graphical representation of the configured joint. It shows a maximum of 15 fingers, the reason being that with a pattern of 10 fingers it is then possible to see what the repeat position looks like, so in effect it shows a view of (1.5 X maximum pattern width) If less than 15 fingers have been selected in 'Number of FINGERS' the view is stretched to make all fingers fit the width of the window.