

For more information on STAIRDESIGNER please visit [www. Stairdesignsoftware.net](http://www.Stairdesignsoftware.net)

Getting Started with Stair Designer Software

Introduction

If you are reading this you are interested in stair building, either as a professional stair builder, carpenter or architect or as an amateur woodworker or builder.

You have probably downloaded a version of StairDesigner and are thinking of trying to use it to build a staircase.

Before starting it's worth noting that although stair building is a complex task, that is considered a specialized branch of carpentry and joinery, someone with woodworking experience, some good software and advice, can make a beautiful hand crafted staircase with little or no previous experience in stair building.

For a professional this can open a new high value added market, that will certainly help to grow your business.

For amateurs you will be able to have the satisfaction of building a very high class piece of carpentry and save yourself a substantial amount of money in the process.

I've written this document to help you get up and running in a minimum amount of time by going through the construction process of an example stair. Although the example stair is fairly complex, with the full size plans and a bit of patience, a professional or experienced amateur woodworker will be able to build these stairs from scratch.

The finished plans of the example stair with all the workshop documents and DXF files can be downloaded from the section "Free Ready to use Stair Templates" at "**Quarter turn closed string with mid turn winders**" on the download page of my blog below:

<http://stairdesignsoftware.net/free-downloads-for-stairdesigner>

These template drawings are the first of a series that I will be putting up for downloading that I hope will give you a faster and easier start to your stair designs.

Although you can just download the examples and print out the workshop documents to start building, I suggest that you preview them with some CAD software and tweak them up for your specific needs.

Before using the template drawings be sure to read the free manual on using DXF files that you can also download from the above page.

If you can't find a design template that suits your specifications send me an email and I'll try to put up a template model to your designs specifications. Email me at:

ness.tillson@stairdesignsoftware.net

For building stairs with special dimensions load the SDS file into StairDesigner, modify the stair parameters and print out the new workshop documents and DXF files. If you don't have the full version for printing you can buy a StairFile and I'll verify your design and send you back the workshop documents and DXF files.

For a video demonstration on how to use DXF files with Autocad read the article on my blog "Using Autocad with a stair calculator" at the link below:

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<http://stairdesignsoftware.net/using-autocad-with-a-stair-calculator>

Getting started with StairDesigner

As with all design software it's tempting to just go at it and start building a stair. This is fine for getting the overall feel of the software and seeing how it works. But be aware that you might come up against several problems.

First of all, when you start, you might find the software intimidating and not easy to understand, this is perfectly normal.

If you are a professional, I'm sure that you have your way of working for stair building and your stair terminology that just doesn't fit the way things are organized and written in the software.

If you're not a professional, all the concepts and terms may just be confusing at first.

The temptation is to just give up and conclude that the software is no good and that it's faster and easier using your old methods. This would be a pity because you'll be missing out in getting the real advantage of the software.

The truth is that it's more than likely the software doesn't speak your language nor fit your mind set, you will have to make an effort to understand the terminology and how the software developers organized the stair design process, and this is probably not the way you would have done it!

What's almost certain is that if you throw yourself into a specific design without any previous knowledge you are likely to find it difficult to get the results you hoped for, get frustrated and maybe give up.

This is one of the problems with a free demo version, as it's free you have no commitment to learn and giving up is easy.

To minimize the frustration of learning StairDesigner, and this is true for any design software, here are some simple tips to help you get started.

The design process should be divided into 7 steps:

- 1) Initial preparation on paper
- 2) Software set up :using the different StairDesigner parameters
- 3) Design the stairs : building the stairs in StairDesigner
- 4) Optimize the design : tweaking the design details
- 5) Printing and DXF export
- 6) Adding features with CAD
- 7) Printing the complementary CAD drawing and templates

Don't forget that the easiest way to get the feel of stair design is to download some of the examples stairs from my website. Take sometime to play around with them and view the way they have been designed and the parameters used to put them together.

Here's the link to the download page: <http://stairdesignsoftware.net/free-downloads-for-stairdesigner>

Before you start using StairDesigner

The initial preparations

Before starting a stair design sit down and do some initial planning, here's a check list of things that you could do:

Make a general sketch of your project with:

- 1) Sizes and angles of the stair well
- 2) The total height of the stairs (if the landing step is recessed to rest on the landing joist above the first floor height don't forget to add this extra height to your stairs)
- 3) The direction of the steps as they move up
- 4) A rough calculation of the step that gives minimum headroom clearance. (this would be the floor to ceiling height minus your minimum head clearance say : 1m90 divided by the approximate step height. These calculations can be very approximate and will be verified and adjusted by StairDesigner)
- 5) Make a dimensioned sketch of the details around the landing step. This sketch should help set up the landing step and the assembly details around the last newel post.
- 6) Make a sketch of the assembly details around newel posts, this is important to get the relative positions of the steps, risers and newel posts. Try to avoid ambiguous positions like nosing flush with the face of the newel post or riser recess half on the newel post, half on the string. These sketches will help setting up the newel posts in StairDesigner.
- 7) Make up a list of the wood thicknesses and sections that you will to be using for each stair part, strings, wall strings, posts, steps, risers and balusters
- 8) Decide how you want to assemble the last step to the landing. (If necessary you should take into account the transition with the horizontal hand rails of the landing or first floor)
- 9) Decide on the type of joints you want to use between strings and newel posts, and handrails and newel posts.(Traditional carpenters use mortise and tenon joints but I find bolted joints easier and faster to implement and stronger in the long run)
- 10) Decide on the joints you want to use between steps and risers, and how much over lap you want on each step.
- 11) Decide on the depth of penetration of the steps and risers into the strings (this should be from 15 to 20mm and can depend on the thickness of the strings, but also on the capacity of the machinery used to rout out the string recesses).

A lot of this information should be put into StairDesigner before trying to build your stair.

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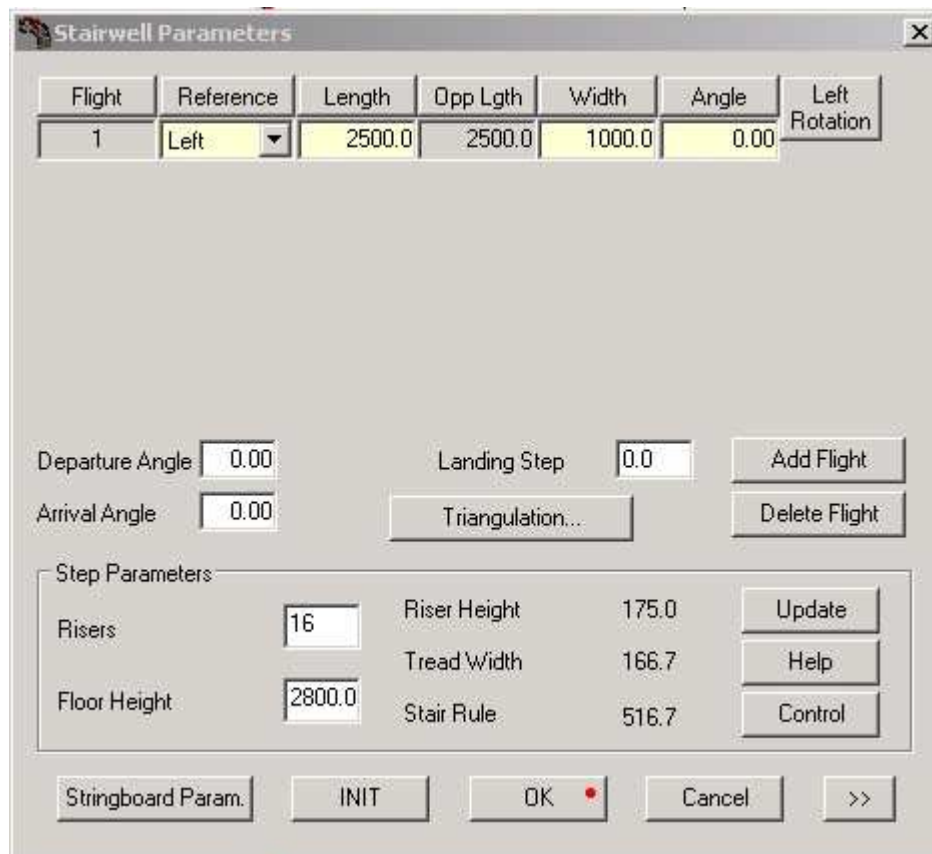
Setting up step and riser parameters.

Before you start building, it's a good idea to set up your stair parts, their dimensions and assembly details.

The best way to work is to set up some basic template drawings that contain the right parts parameters. You can use this drawing when you want to draw a similar stair.

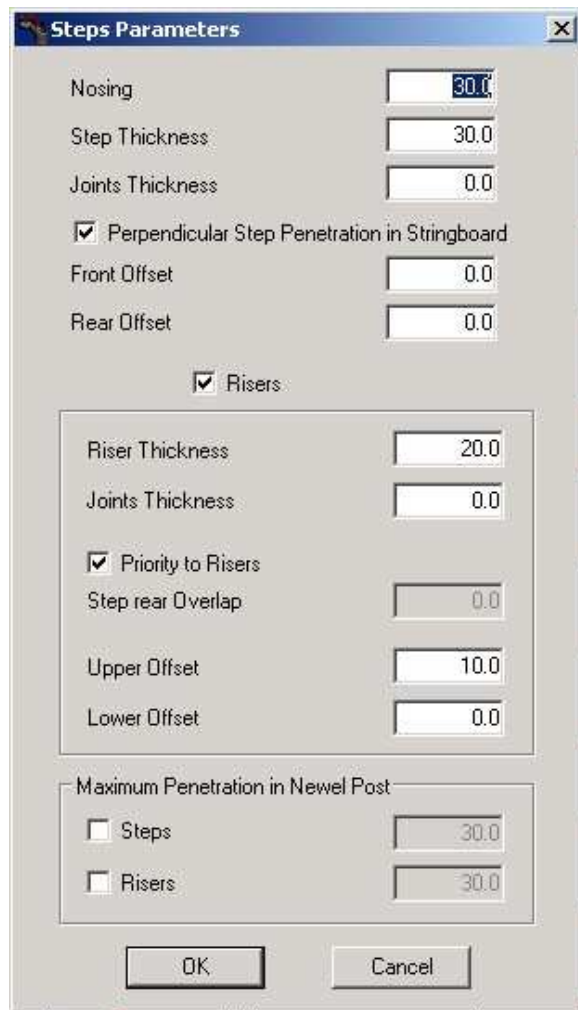
Note that you can use the example drawings from my site as templates.

To make a simple template open up a new stair and in the STAIR WELL PARAMETERS box just click OK. StairDesigner will draw a simple straight flight.



Next open up the PARAMETERS menu and click STEP PARAMETERS.

Fill in the STEP PARAMETERS dialogue box as in the picture below :



Put in the nose over lap, the step thickness (for a wooden stair leave the JOINTS THICKNESS at 0, this is for concrete stairs only).

Tick PERPENDICULAR STEP PRENETRATION.

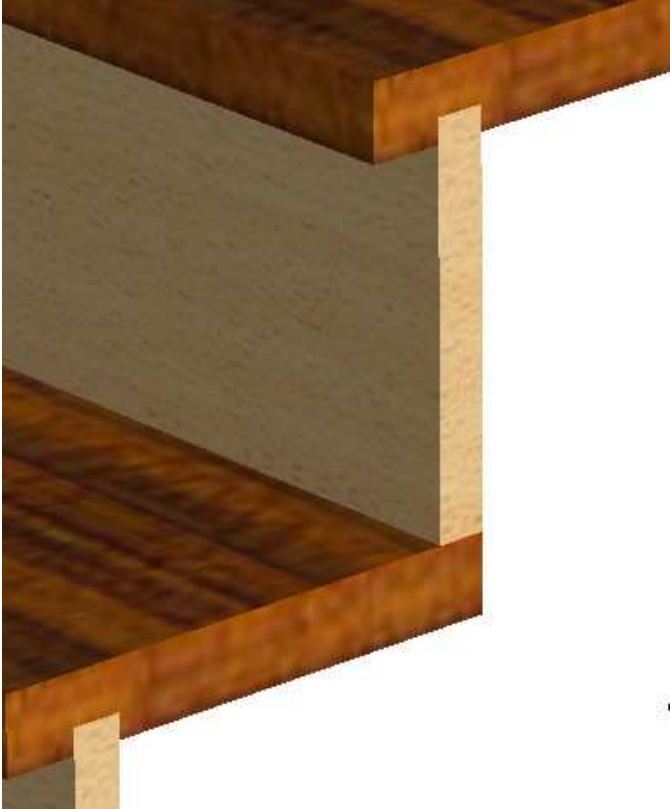
This parameter cuts the step nosing to fit perpendicularly into the string recess

Tick the RISERS box if you want risers and give them their thickness (leave JOINTS THICKNESS at 0).

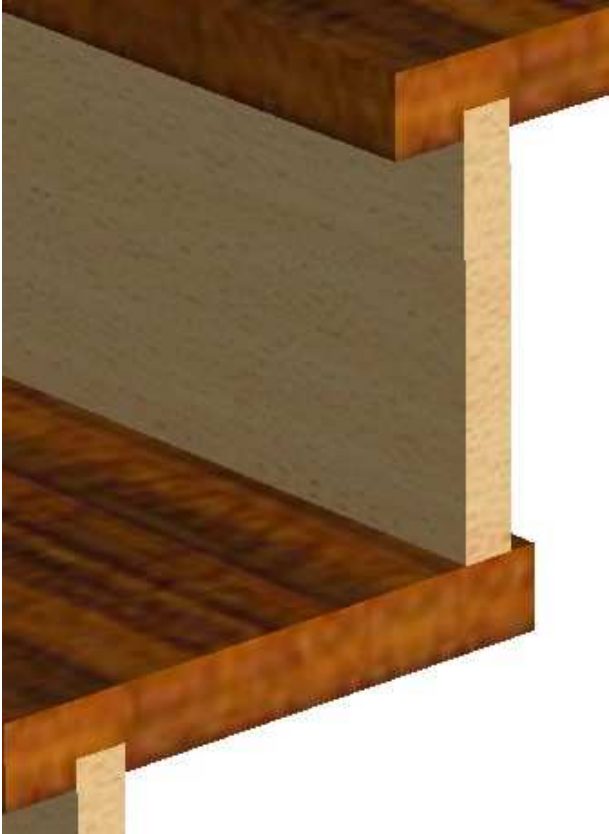
The PRIORITY TO RISERS box defines if you want the risers to pass behind the proceeding step or lay on top of it.

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The next image shows PRIORITY TO RISERS unticked:

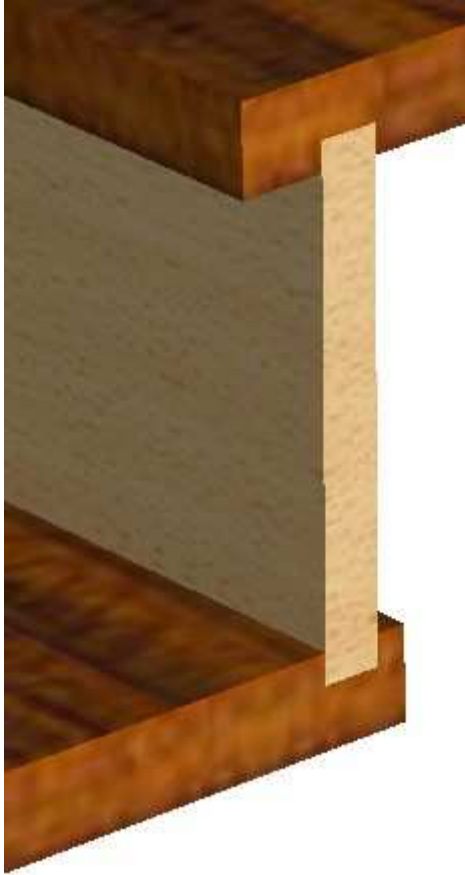


In this case STEP REAR OVERLAP gives the distance the step goes beyond the back of the riser



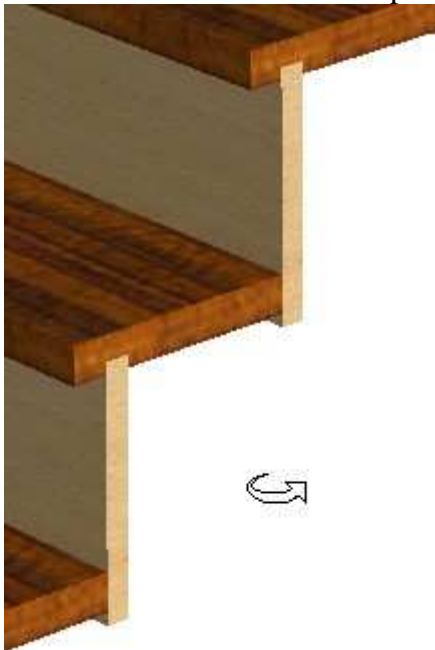
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And LOWER OFFSET sets the penetration into the upper face of the step



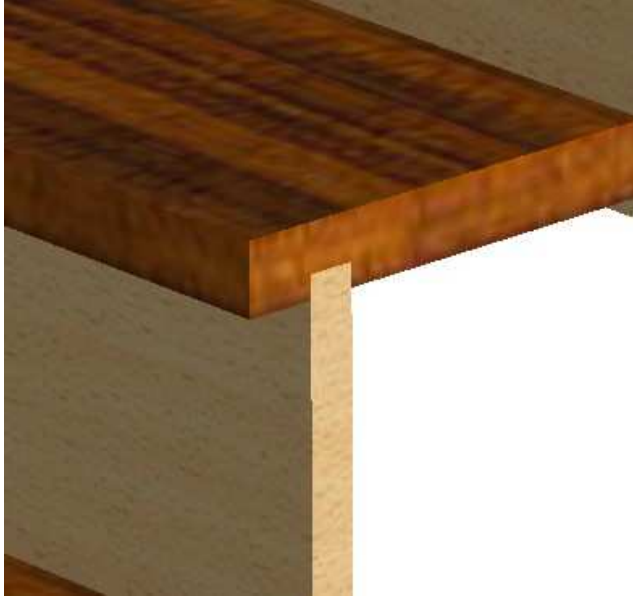
This image shows PRIORITY TO RISERS ticked:

When PRIORITY TO RISERS is on LOWER OFFSET set the distance the riser goes beyond the under side of the lower step.



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The UPPER OFFSET this is the penetration into the under side of the step above the riser.



Give the value of the MAXIMUM PENETRATION INTO NEWEL POST for the risers and steps. In general this is the same value as the penetration of the steps into the strings.

Click OK and the steps and risers for this staircase are set up.

Setting up string board parameters

To set up your string boards open the PARAMETERS > STRING BOARD PARAMETERS dialog box and fill in the values below:

The screenshot shows the 'Stringboards Parameters' dialog box. It has a title bar with a close button. The main area is divided into several sections. At the top, there is a checked checkbox for 'Stringboards'. Below it are two radio buttons: 'Stringboards in Stairwell' (selected) and 'Stringboards off Stairwell'. The next section contains two checked checkboxes for 'Left Side' and 'Right Side'. Below these are two columns of input fields. The first column has 'Thickness' (30.0), 'Steps penetration' (15.0), 'Steps Recess' (15.0), 'Risers Penetration' (15.0), 'Risers Recess' (15.0), 'Penetration in Newel' (0.0), and 'Offset in Newel Post' (0.0). The second column has '50.0', '15.0', '15.0', '15.0', and '0.0'. The next section has 'Width' (350.0), 'Width above Nosing' (20.0), 'Height above Nosing' (20.0), and 'Control of Minimum Height beyond Steps' (20.0). The 'Stringboard Type' section has three radio buttons: 'Parallel to Winders and Fixed Steps', 'Parallel to all Steps' (selected), and 'Theoretical Stringboard'. Below it is 'Smoothing Factor (0-6)' (1). The bottom section has 'Length beyond the first Step' (30.0) and 'Length beyond the last Step' (60.0). At the bottom are 'OK' and 'Cancel' buttons.

In the top section, you tell StairDesigner if you want strings on the right and / or on the left of the stairs, their thickness and the depth of penetration of the steps and risers into the strings.

The PENETRATION IN NEWEL parameter is the extra wood allowed for jointing. If you want a 30mm tenon machined on the string you put this value at 30. In general I prefer bolted joints so I leave this value at 0.

If you define a penetration into the newel post the OFFSET IN NEWEL POST parameter enables you to define the tenon length by cutting it either side of the full string width.

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The middle section gives the total width of the strings and the distance, perpendicular to the edge of the string, (WIDTH ABOVE NOSING) or vertical (HEIGHT ABOVE STRING) between the step nosing and the edge of the string.

When the stairs are built with winders the strings are curved and the curves can be calculated in several ways:

PARALLEL TO WINDERS AND FIXED STEPS

This option draws the curve according to the position of the winders and fixed steps. The distance between the nosing of the other steps and the string edge vary.

PARALLEL TO ALL STEPS

This option draws a curve parallel to all the step nosing. Depending on the position of the steps this curve can be erratic, but all the distances between step nosing and string edge are the same.

THEORETICAL STRINGBOARD

This option uses the theoretical balanced step position originally calculated by StairDesigner and should give a very harmonious curve to your string, but some steps may go over the string edge and the nosings are not all the same distance from the string edge.

This option usually works well but you may have to increase the string width to keep all the steps within the string.

SMOOTHING FACTOR

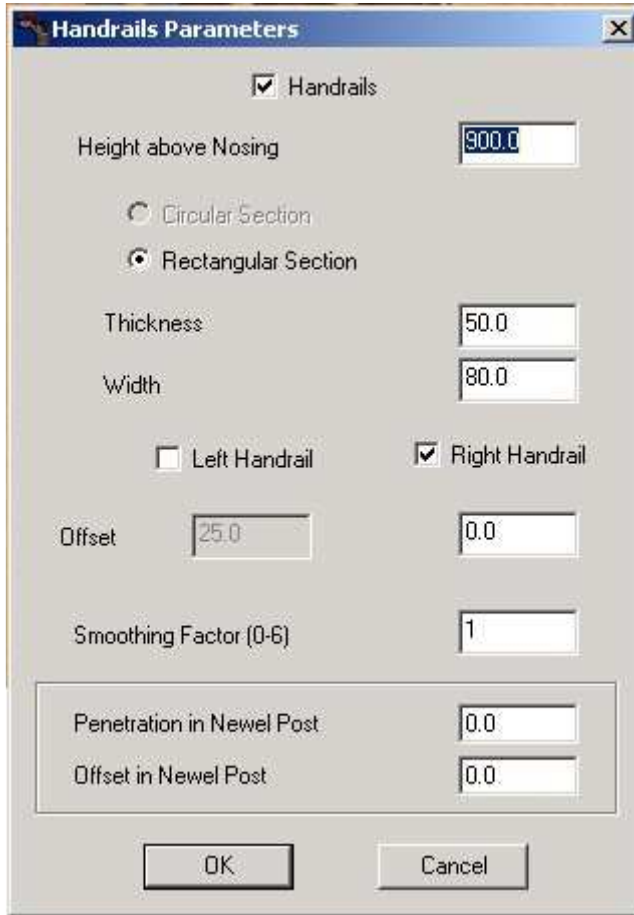
When you export DXF files the curves are drawn as short straight lines. With a high smoothing factor you will get a smooth curve and lots of lines, and with a low value, jagged curve with fewer lines.

Note that it is often necessary to modify the curves in a CAD program before machining, so I suggest a low value for ease of editing.

Download the "[Using StairFile.pdf](#)" document for more details on DXF files and optimizing stairs in Autocad

Setting up handrails

Hand rail parameters are similar to stringboard parameters. Set up handrails as below using the PARAMETERS > HANDRAIL PARAMETERS dialog box.



Hand rail set up is easy, just type in the height above the step nosing, the thickness and the width or height of the handrail section.

Tick the left and right handrail boxes to draw or not draw rails on each side of the stair.

The OFFSET parameter defines the position of the handrail axis line, relative to the axis of the stringboard (or the end of the steps if there is no stringboard). An offset of 0 keeps the handrail axis directly aligned above the stringboard axis.

Setting up balusters

With StairDesigner you can set up different types of balusters or spindles. StairDesigner gives the general shapes but can't draw the details.

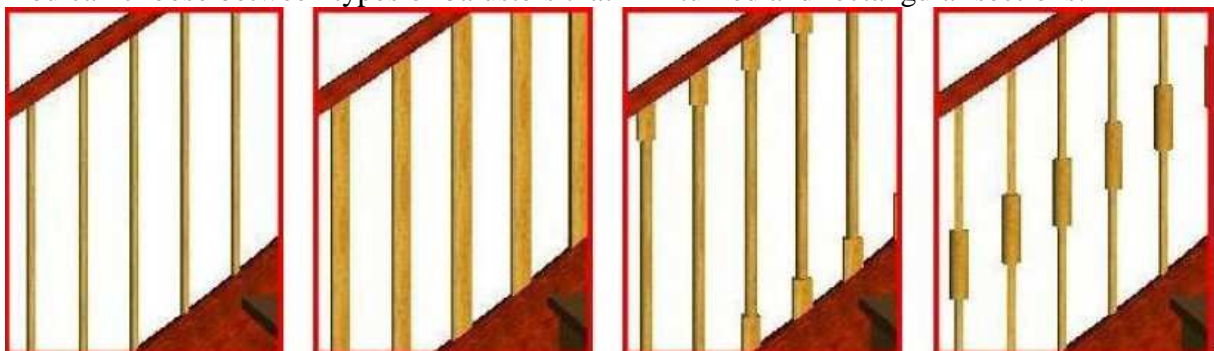
To set up the baluster use the BANISTERS PARAMETERS dialog box and fill in as below:

The screenshot shows the 'Banisters Parameters' dialog box with the following settings:

- Left Banisters (Default)
- Right Banisters (Default)
- Rectangular Section:
- Circular Shaft:
- Constant Shaft Spindle:
- Variable Shaft Spindle:
- Shaft Diameter: 30.0
- Base Section: 30.0
- Shaft Height: 600.0
- Maximum empty Space between Banisters: 110.0
- Perpendicular Machining with 1 Chamfer:
- Perpendicular Machining with 2 Chamfer:
- Vertical Machinin:
- Top Penetration Height: 20.0
- Bottom Penetration Height: 20.0
- Banisters in Step:
 - Fixed Distance:
 - Distance to Step: 20.0 (Left Handrail), 20.0 (Right Handrail)
 - Equidistance:
 - Distance to other Banisters: 80.0 (Left Handrail), 80.0 (Right Handrail)
 - Minimum Distance to the next Step: 20.0 (Left Handrail), 20.0 (Right Handrail)

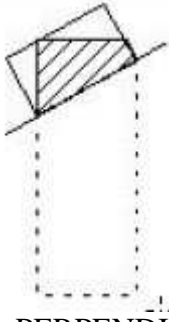
Tick the left and/or right boxes to insert balusters on either side of the stairs.

You can choose between types of balusters that mix turned and rectangular sections.

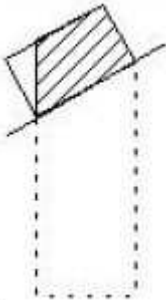


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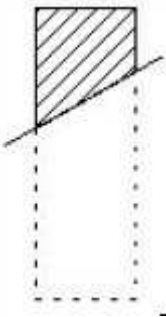
The way the balusters assemble into the strings and handrails is defined by choosing PERPENDICULAR MACHINING WITH 1 CHAMFER :



Or PERPENDICULAR WITH 2 CHAMFER:



Or VERTICAL:



The options **BANISTERS IN STEP** are used when balusters are assembled onto the step in the case of cut strings.

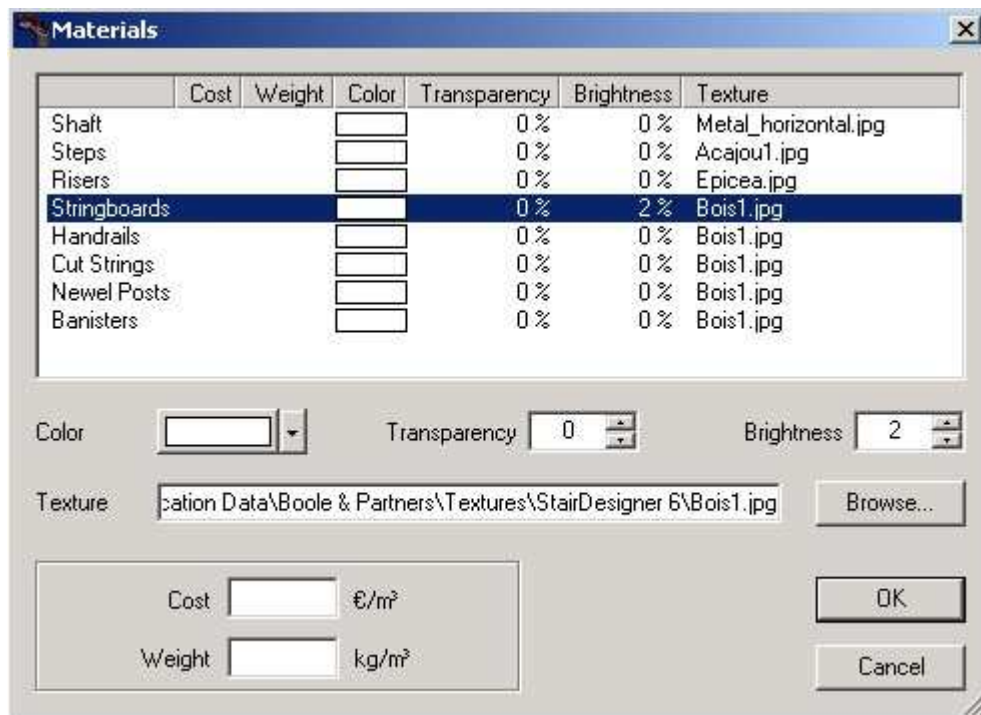
Setting up the materials

To set up the different types of materials open up the PARAMETERS menu and click MATERIALS.

StairDesigner will show the materials dialog box where you can set the different textures and cost and weight parameters for each stair part.

To use this feature select a stair part and fill in the values for the selected part. The texture files are just JPG files, you can use the standard files or make your own.

Fill in the values as below.



To choose a texture file click on the browse button, note that you can see the texture before applying by right clicking your mouse on the file and doing a preview in Windows.

Building the stairs

Now nearly everything is set up, open the STAIR WELL PARAMETERS dialog box to start building the stairs. To open the box use either the PARAMETERS menu or the blue STAIR WELL PARAMETERS button.



The Stair well parameters dialog box.

Flight	Reference	Length	Opp Lgth	Width	Angle	Left Rotation
1	Left	2500.0	1500.0	1000.0	0.00	<input type="checkbox"/>
2	Left	2500.0	1440.0	1000.0	90.00	<input type="checkbox"/>

Departure Angle: 0.00 Landing Step: 60.0 Add Flight

Arrival Angle: 0.00 Triangulation... Delete Flight

Step Parameters

Risers	15	Riser Height	186.7	Update
Floor Height	2800.0	Tread Width	268.8	Help
		Stair Rule	642.1	Control

Stringboard Param. INIT OK Cancel >>

This box lets you input the sizes of your stair well. Take the sizes from your sketch where you roughly calculated the position of the stairs and the minimum head room. Give the landing step enough width so that the nosing and the riser will either be recessed into the string or the last newel post, don't put the landing step nose flush to the face of the newel post or the riser flush or half on the post and half on the string. I like to give this step at least 60mm width, but this will depend on the newel post, the step overlap, (that is the position of the riser to the step nosing) and the type of assembly with the landing.

Use the upper half of the dialog box to input the stair well dimensions. Then use the lower part to use StairDesigner to calculate the stairs.

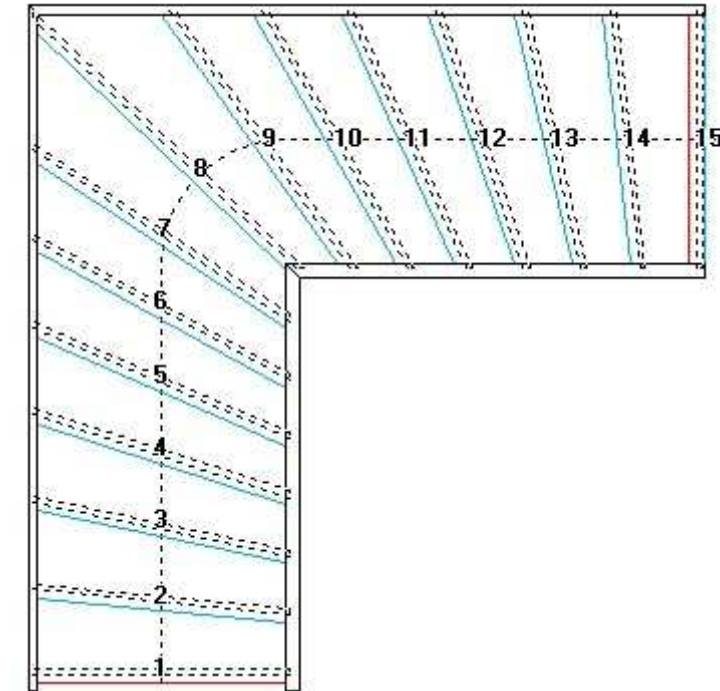
Once you have input the total height of the stairs and the approximate number of risers click on the update button and StairDesigner calculates the rise and the going of each step and tells you if it complies to the control values, in general $2 \times \text{riser height} + \text{going} > 600 < 640\text{mm}$ (Blondel's rule).

If the OK button is GREEN the stair complies to the control values, if it's RED the stair doesn't comply and you will have to modify the number of steps and / or the length of the stairs. The easiest way to know what to do is just to let StairDesigner optimize for you.

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Click on the HELP button and StairDesigner will give you some options: modifying the number of steps and / or the total length. If you choose to modify the length of the stairs you can choose to change the first or the last flight. Click the option you consider best and the OK button will go GREEN

Click OK and StairDesigner will draw your stairs.



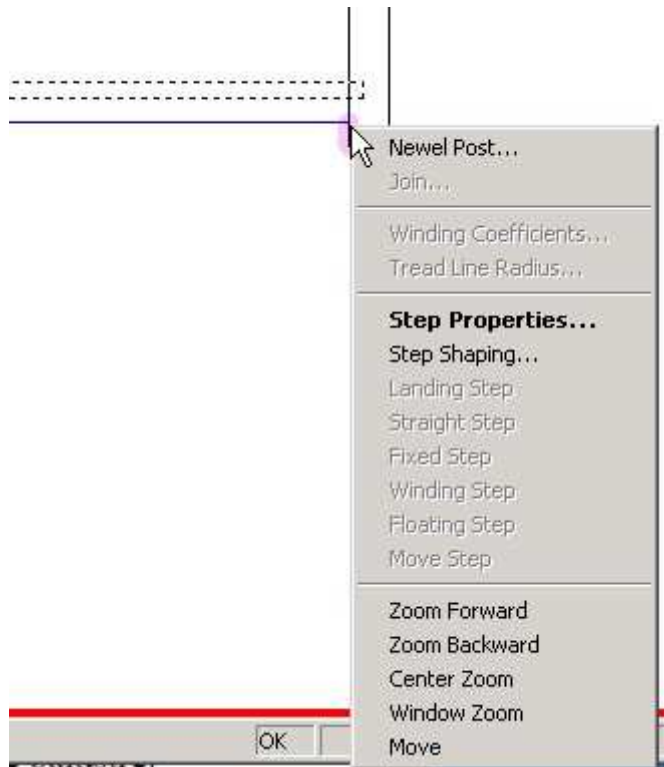
Newel Posts

After closing the STAIR WELL PARAMETERS dialog box StairDesigner draws a plan view of the stairs using the type of strings, steps and risers that you have specified. All that is left to do is to add newel posts and optimize the design.

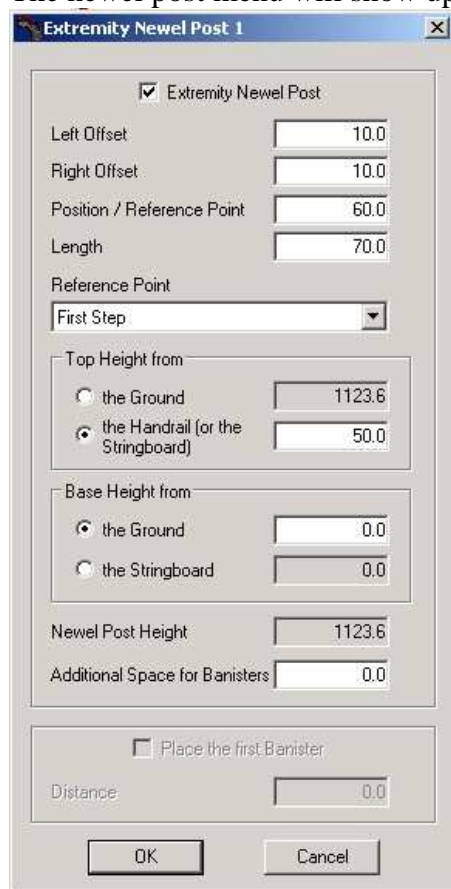
Adding newel posts

We are going to add a newel post at the start of the stair. Hover your mouse over the end of the stringboards on the step side.

When you get a pink dot displayed click right on your mouse and select NEWEL from the pop up menu.



The newel post menu will show up, fill in the values as below:



Tick EXTREMITY NEWEL POST to draw a newel post at the end of the first string.
Newel posts are always rectangular sections.

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Newel post widths are defined by their off set each side of the stringboard.

The total width of the newel post is calculated by: left offset + stringboard thickness + right offset.

Newel post length, (length here means the other dimension of the rectangular section, as opposed to HIEGHT, which is the length of the post) is defined by the LENGTH parameter in the EXTREMITY NEWEL POST dialog box.

The POSITION/REFERENCE POINT parameter defines the distance of the back of the newel post from either the end of the string or the first step, as set in the REFERENCE POINT box.

The section TOP HEIGHT FROM allows you to set the top of the newel post as a distance either from the ground or from the stringboard (if there's no handrail) or handrail height. The BASE HEIGHT FROM gives the position of the bottom of the newel posts relative either to the ground or the bottom of the stringboard.

NEWEL POST HEIGHT is the total length of the post calculated from the other parameters.

ADDITIONAL SPACE FOR BANISTERS allows a bigger gap between the first spindle and the newel post if the newel post is of a special design.

Click OK to insert the newel post.

Do the same to insert the intermediary newel post and the post on the landing step.

Fill in the CORNER NEWEL POST dialog box as below:

Corner Newel Post 2

Newel Post

	Lower Flight	Upper Flight
Left Offset	10.0	10.0
Right Offset	10.0	10.0
Rear/Front Offset	0.0	0.0

Top Height from

the Ground 2642.2

the Handrail (or the Stringboard) 50.0

Base Height from

the Ground 914.1

the Stringboard 50.0

Newel Post Height 1728.0

Additional Space for Banisters 0.0


Place the first Banister

Distance 0.0 0.0


OK Cancel

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Note that the section of the intermediary corner newel post is defined by the right and left offset from the stringboard. The REAR/FRONT OFFSET parameter gives an “L” or angle section to the newel post.

Once the newel posts have been added you can view the stair in 3D by clicking on the 3D button in  the tool bar.

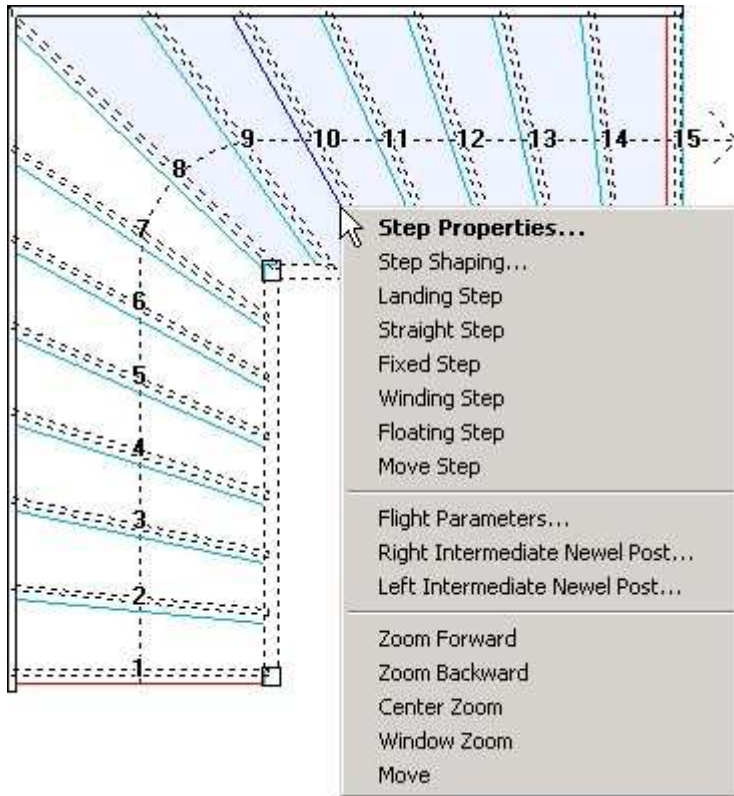


To go back to a plan view by clicking on the 3D to 2D button . 

Optimizing the stairs

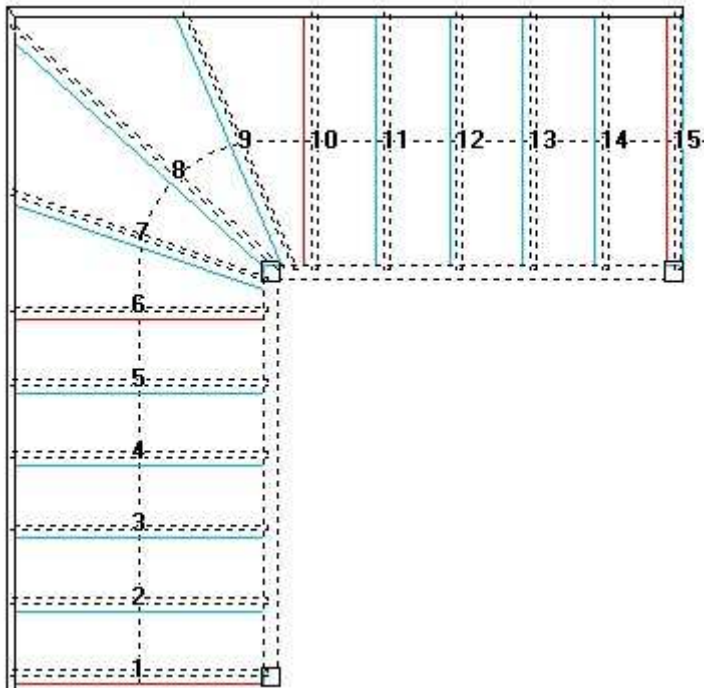
By default StairDesigner draws the stairs with all the steps “balanced” or tapered. This gives the smoothest shaped strings but often makes building the stairs more complicated than limiting the winders to the turning and using more straight steps.

You can change the number of winders by defining straight steps either side of the turning. To do this in our example stair, hover the mouse over step 10 and right click.



From the STEP PROPERTISIES menu choose STRAIGHT STEP and StairDesigner will redesign the stairs with step 10 as straight.

Repeat on step number 6 and you should get the following plan.



Note that the STEP PROPERTISIES menu contains several different options that allow you to modify the step positions to tweak the stair design, optimizing the stair parts for easier assembly and manufacturing.

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Conclusion

Once your stair finished, you can print out the workshop documents and DXF files. Before using the DXF files for building you should check them through and eventually optimize them for your specific needs.

Read the “Using StairFiles.pdf” to learn how to use DXF files.
Download this document from:

<http://stairdesignsoftware.net/free-downloads-for-stairdesigner>

This tutorial covers the fundamentals of StairDesigner and is just an over view of the its different possibilities.

If used properly and in an organized manner, StairDesigner can greatly speed up the design process, gaining time and money if you're a professional carpenter and smoothing out the complicated maths and marking up for amateurs and professionals alike.

For professionals and amateurs that are not familiar to stair building the manufacturing documents and full size templates will help you build stairs faster and easier.

I hope that this document has been of use to you. Feel free to send me an email if you have any questions or remarks or if you need custom templates or personal coaching.

Happy woodworking to you all.

Ness Tillson