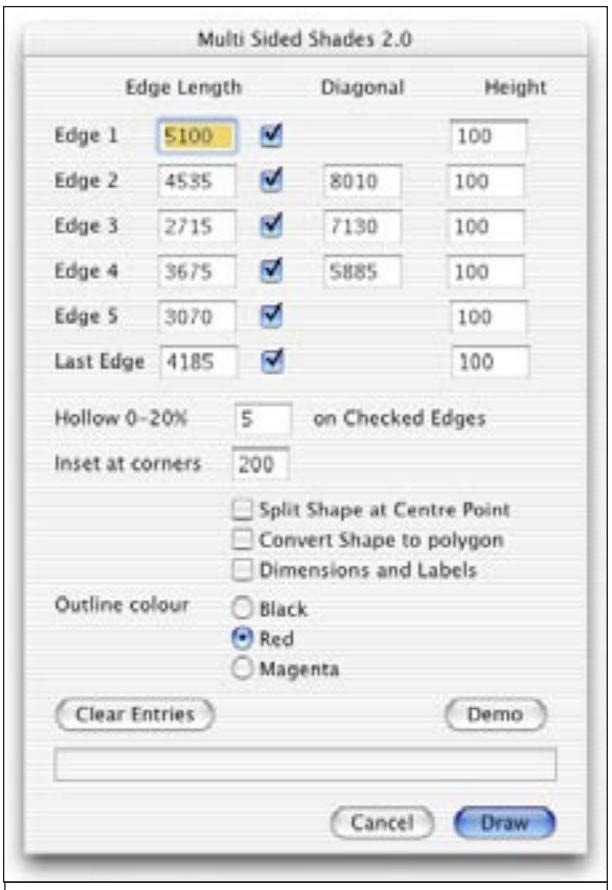
Shade Structures

Designing patterns for shade cloth structures and shade sails is an easy task with Aeronaut's Vectorworks multi-sided shades plug-in. Using measurements taken on site, you can design structures with 3-6 sides, generate the panels, and have them ready to cut in minutes.

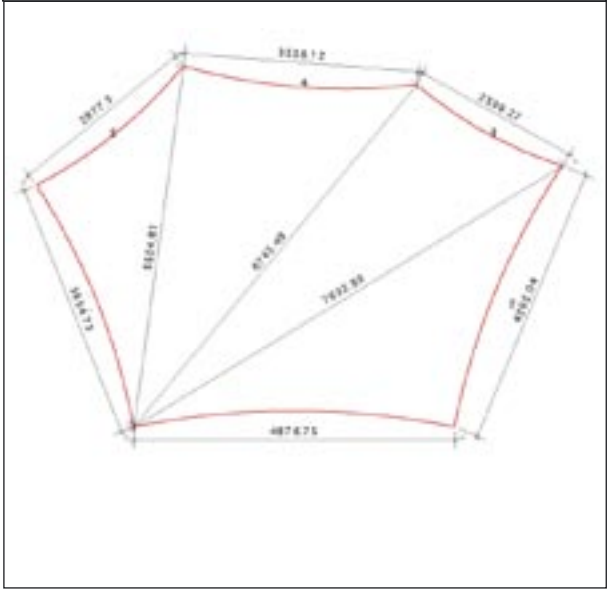
Structures with many more than 6 sides can be designed by breaking up the shape into simpler areas. These techniques cover the vast majority of simple surfaces made from fabric such as shade cloth, where a full 3D surface model is not necessary.

To begin with, you need to know the length of each side, and check diagonals. If all these can't be measured on site, you can draw a quick ground plan in Vectorworks and calculate what you can't measure. Lines can be easily dimensioned in Vectorworks, the area and perimeter calculated to the millimetre.



If the pattern shape is not flat, the multi-sided shades plug-in will calculate the lengths of edges in a 3D plane so the final fabricated shape accurately fits the structural components and the ground plan.

Working in a clockwise direction, you enter the dimensions into the Generate Shades macro… first side length, second side and check diagonal, and so on, finally entering the last edge.



The shape will be generated as one single polygon or a series of triangular polygons for easier or more attractive panel layouts. You can choose to put hollow into any unsupported edges. The amount of hollow in the unsupported edges can be easily re-adjusted in Vectorworks, and the centre position of the triangular panels can be moved.

The generated shape has check dimensions so you can compare it with the original ground plan.

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When the shape has been generated in Vectorworks you add any seam or welding allowances, rope edges, and deductions for corner fittings and reinforcements. If you know the stretch factors of your fabric, it's a simple matter to proportionally scale panels to adjust for fabric stretch.

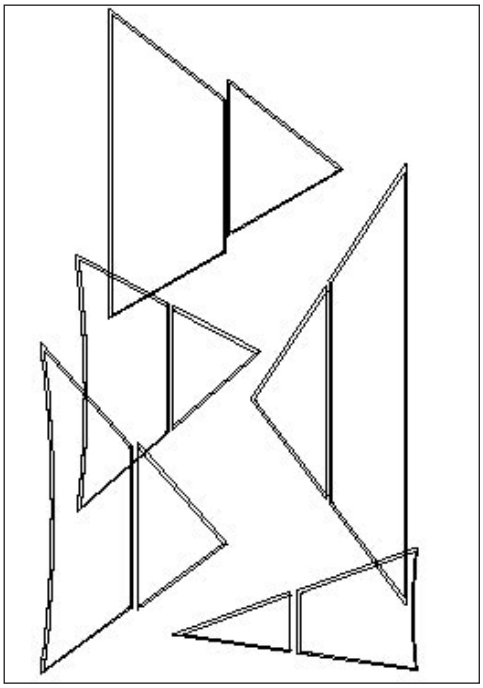
The resulting panels are then imported into Tangent for nesting, plotting and cutting. You can get accurate figures of edge lengths in Vectorworks for calculating wire quantities. Tangent will give you a figure for fabric length and waste.

Shade Cloth Hypars can also be made using the Generate Shades macro. This duplicates the methods used 'on the floor' to make hypars from shade cloth and other fairly stretchy fabrics, where the tension on the fabric and its stretch factor are used to get a fair 3D shape.

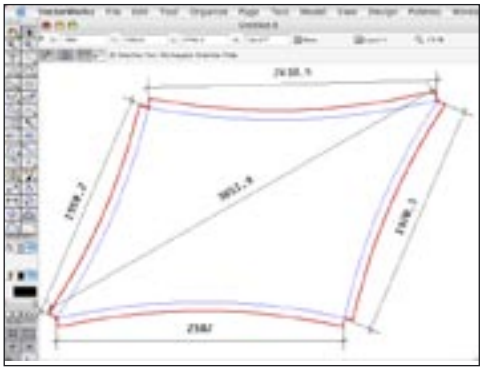
The macro generates four sided shapes, and these sides can be of any length. Five or more sided Hypars can be made by clipping any corner in Vectorworks to get the final shape. The shape can be slightly rescaled in Vectorworks to correct for fabric stretch, rope edges added, and the shape exported into Tangent.

In Tangent, you can split panels and add seam allowances just by reducing the width of the fabric. When a panel is imported into Tangent which is wider than the set fabric width, Tangent will ask if you want to split the panel and add a seam allowance, or to adjust the fabric to suit the panel.

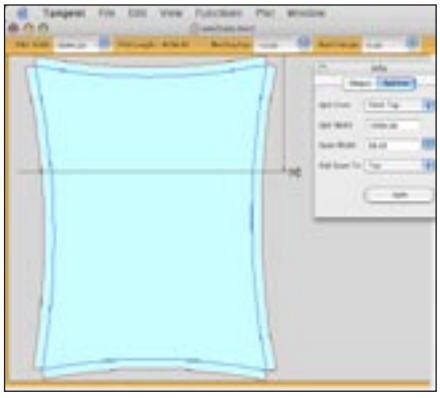
Setting the fabric width to less than the panel width at any time will bring up this dialog, allowing an easy way of splitting panels. For more complex shapes, see the Aeronaut information sheet on Tension Membranes.



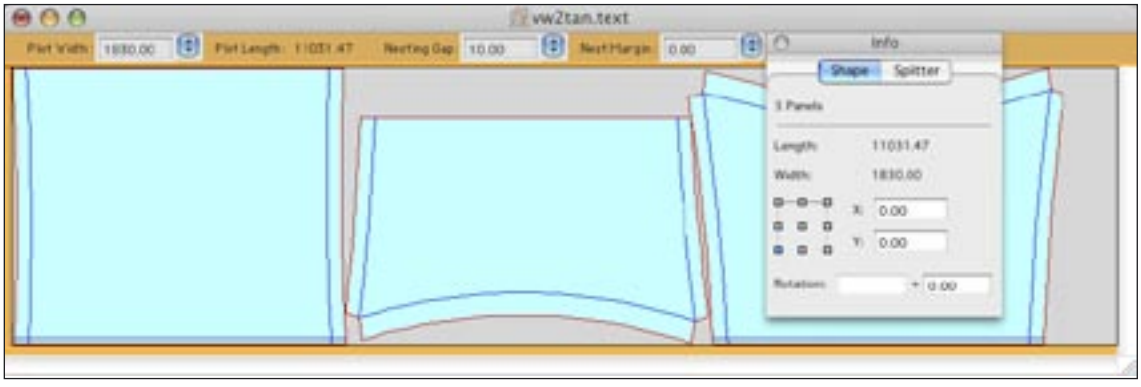
Panels split in Vectorworks, with seams added.



Hypar dimensioned in Vectorworks.



In Tangent, ready to split.



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