SHAPING LIGHT

The Pinch series examines ways that self-latching tabs can buckle a surface into relief patterns. The alternate concave and convex surfaces are designed to bounce light in ways that vary according to viewing angles and incident light. Each pattern is generated by cutting and curving a single sheet with minimal waste.

The examples show how tabs in one, two and three directions can generate repetitive lattice patterns. In each case, the tension of the tabs is relieved through slits whose edges form curves with depth proportional to the cinching tension. If the amount of tension at each pair of tabs could be variably adjusted, then the surface could change from a large fairly flat surface to a smaller surface with high relief.

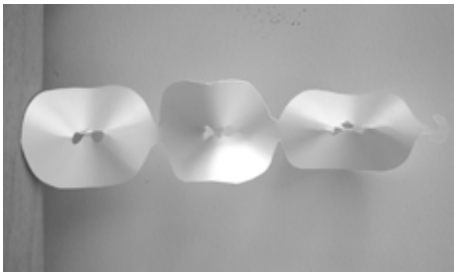
The proportions of opening to module is a trade-off. A larger interior opening allows a more dramatic tensioning because the depth of the pattern depends on the distance between the bases of lower and upper tabs. A smaller interior opening means there is more surface to catch the light.

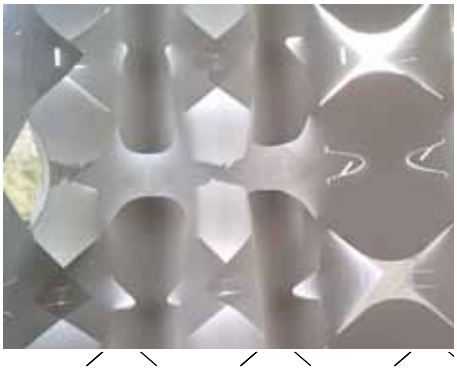
The patterns are suitable for sun shading screens as partition walls, furnishings or ceiling skylight diffusers. They were prototyped in paper and polypropylene (Yupo) with a lasercutter after initial manual experiments. The forms could be adapted to other materials that have a combination of stiffness, malleability and tensile strength. The dimensions of the apertures and nature of the connections have to be adjusted to suit the material, proportions could be changed for different amounts of permeability.

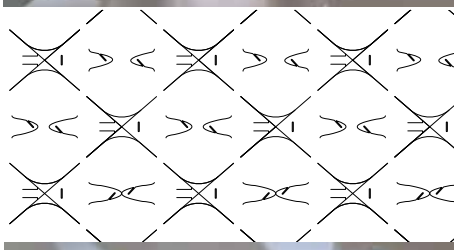
At the connection between modules, the surface twists to accommodate different directions of curvature. Large installations could be created by substituting an appropriate joint for the hinge-like continuous surface.

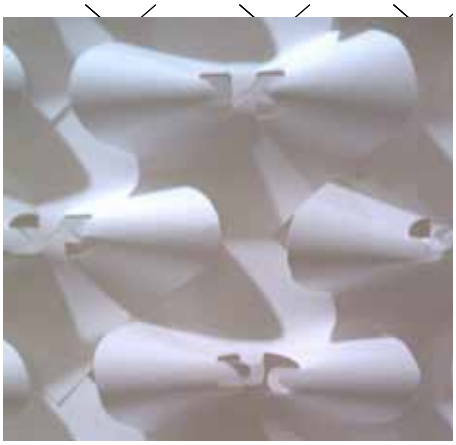
The screens can be fixed into different stable configurations or given a kinetic aspect, according to the way that the pieces are connected. The amount of buckling can be controlled according to the tab placement and tension**. When created in flexible material, the twisting connections act like hinges, allowing the components to move between concave and convex. Secondary surfaces can be connected to create a flat plane, a cylindrical curve or double curvature surfaces such as saddles.

12/31/12 Nancy Yen-wen Cheng



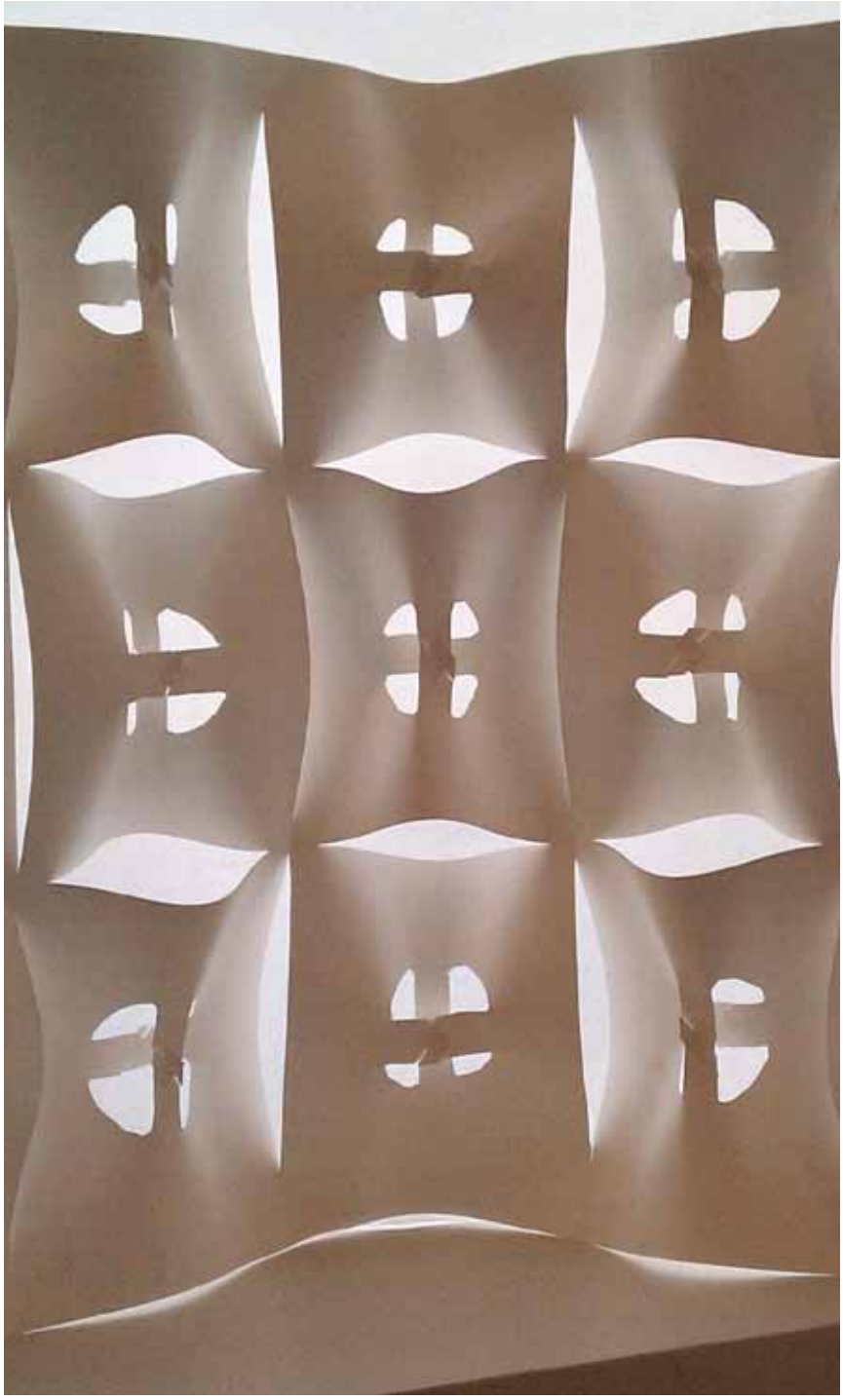


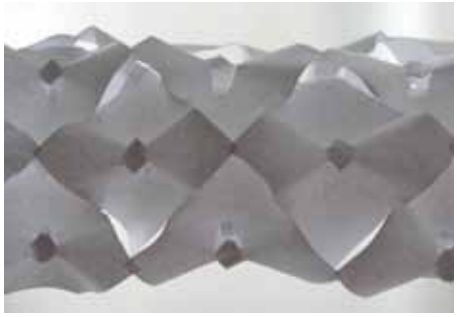


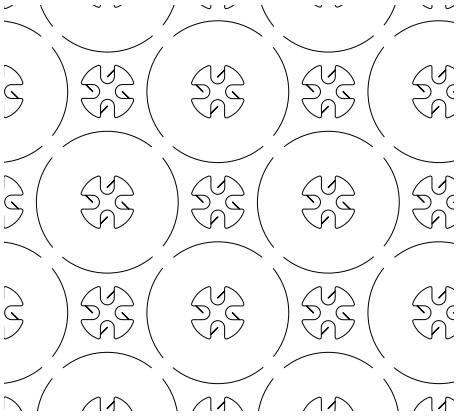


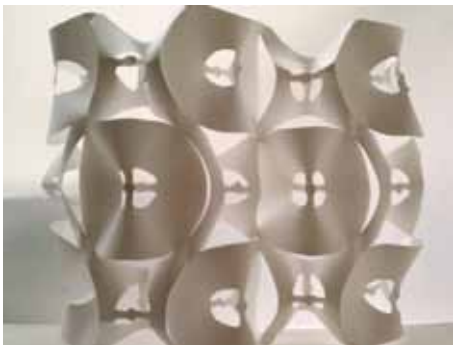
MANTA – Curtain fold

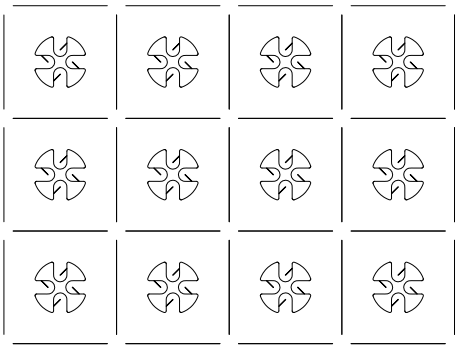
Tensioning modules in a single direction eliminates the twisting stress between different curvatures. The resulting surfaces catch the light in a consistent way unless the modules are tilted.





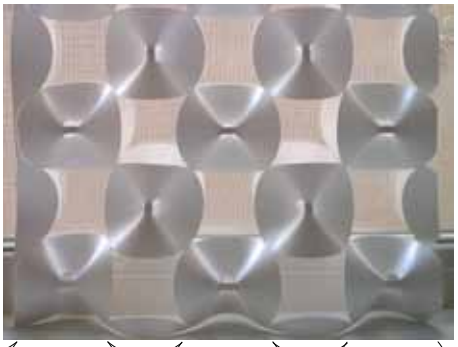


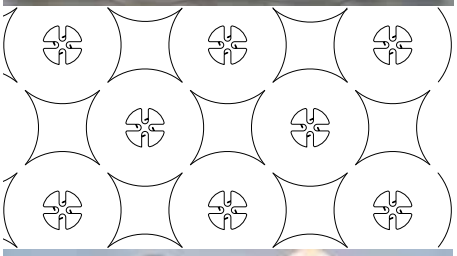


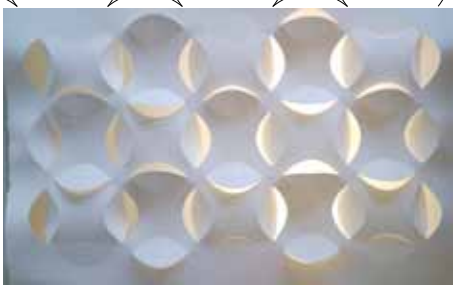


SQUARE, DIAMOND & X–O

Cross-tensioning two perpendicular tabs creates a saddle surface. The Square grid creates s-shaped light scoops; proportions could be adjusted for more bounced light. Compared to the Square grid's fixed corners, the Diamond grid's corners are can be free or fixed into different configurations. Narrow legs of the X-O buckle in irregular folds due to their narrow width.

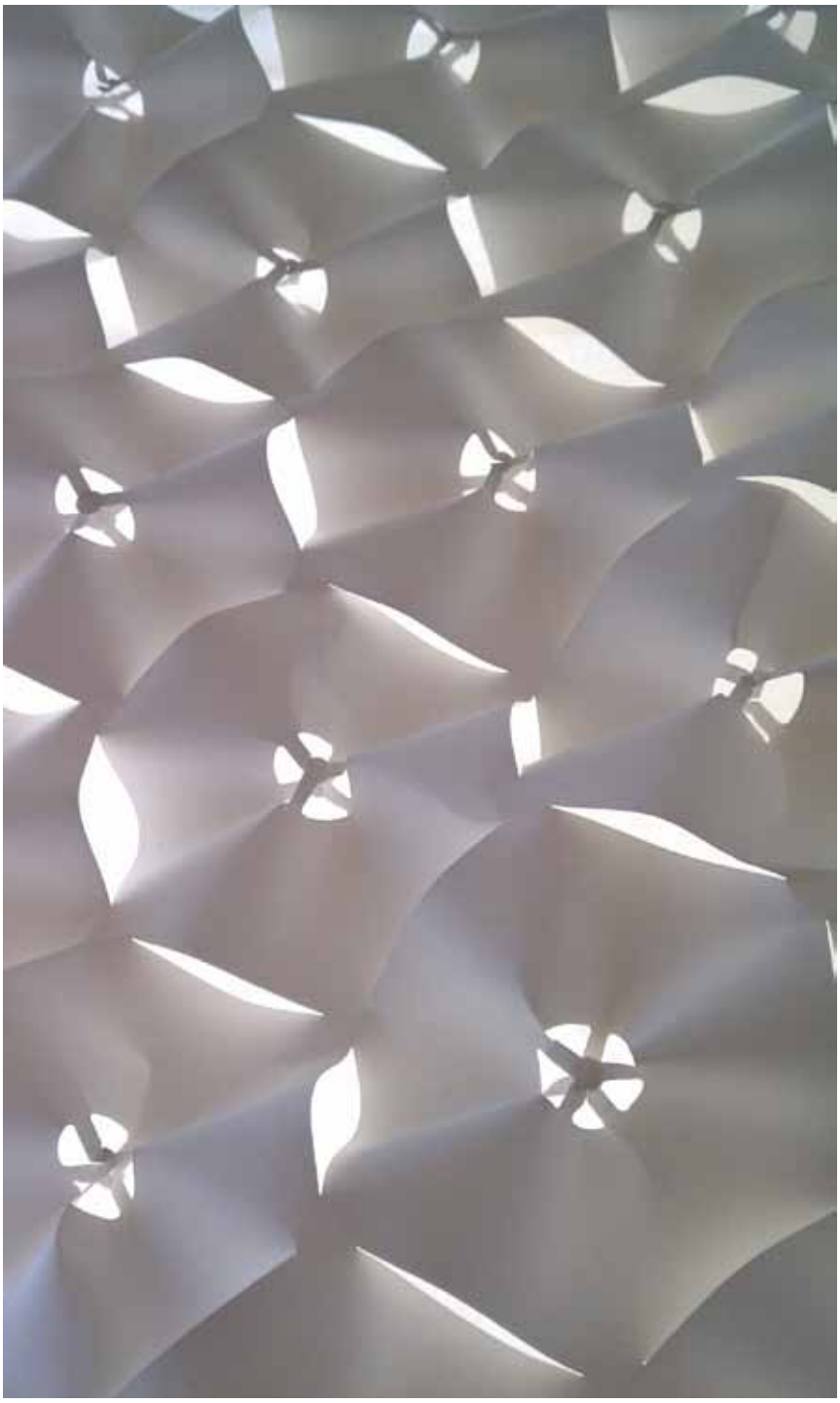


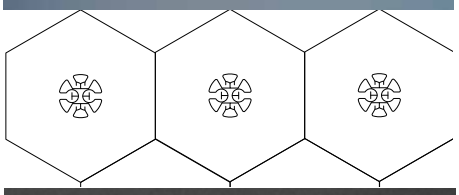


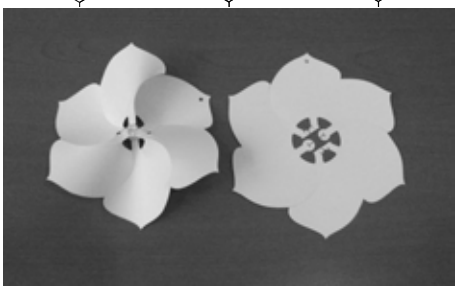


ORCHID saddle checkerboard

Alternating modules were eliminated to give each joint visual breathing room. This allow each module to have a pure circular shape and creates a convex-concave checkerboard with no twisting joints.







SNOWMATRIX

Deflected hexagon catches light from multiple directions and opens up design applications. Connecting three tabs in a Y-joint is more technically challenging than connecting two tabs in a line.