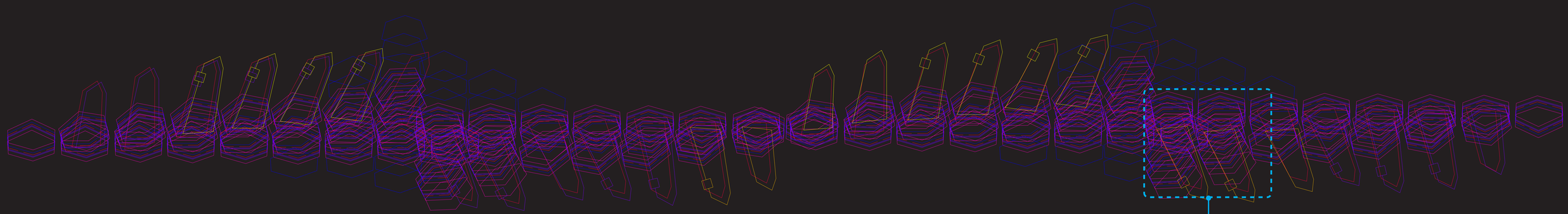
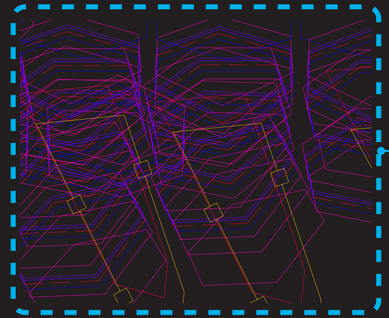




fluctuation detail: this detail illustrates one of the two most rapid and intricate moments during the fluctuation.

fluctuation study: the diagram and detail is a study of differentiated fluctuations and movements of the roof system on a horizontal plane.

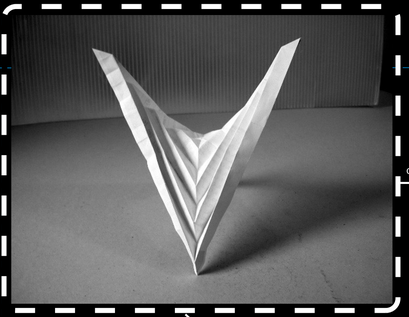
1. each line and colour represents the roof horizontal at a different location of movement.

2. the blue and light pink represent the stationary formation

3. while the dashed and longer orange, yellow, and purple lines represent altered movements along the plane.

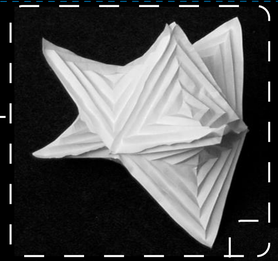
4. each movement is altered a 3 metre interval, where each 30 degrees rotation is shown by the yellow lines.

5. the shifts from blue/pink to purple are to indicate the friction and movement between each fixed element.

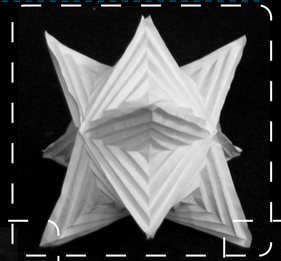


singular hypar cell unit transformation >>>>>>

original form 1.0

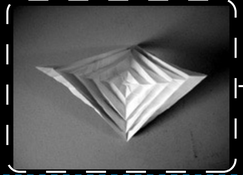


transformation 2.1

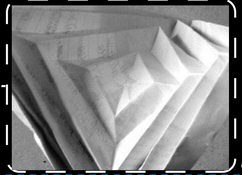


transformation 2.3

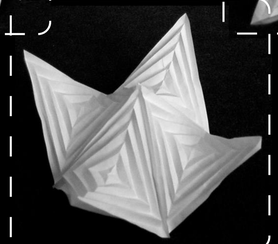
plan view 1.1



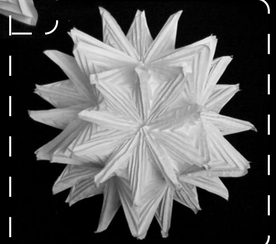
detail view 1.2



left: detail of the flexible creases



transformation 2.2



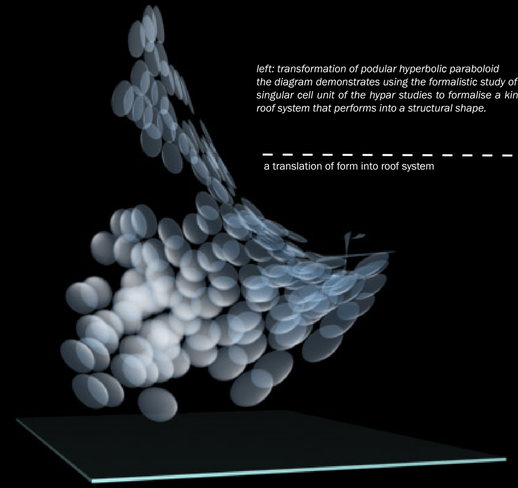
transformation 2.4

Hyperbolic Paraboloid:
A quadric surface with parabolic cross-sections in two perpendicular directions, and hyperbolic cross-sections in the other.

providing: refractatory acoustics + permeability + flow + fluidity

the term hypar to mean a hyperbolic paraboloid shape, or more formally a partial hyperbolic paraboloid, cut from the full infinite surface. The term hypar was introduced by the architect Heinrich Engel in his 1967 book Structure Systems. [reference information cited from Erik Demaine's studies of Hyperbolic Paraboloids at MIT]

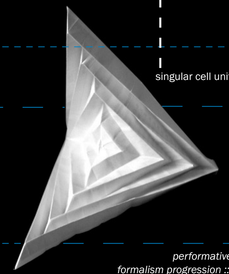
clockwise from far left:
double trihedron; tetrahedra; octahedron; hyperhedra;



left: transformation of podular hyperbolic paraboloid
the diagram demonstrates using the formalistic study of the singular cell unit of the hypar studies to formalise a kinetic roof system that performs into a structural shape.

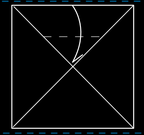
a translation of form into roof system

singular cell unit



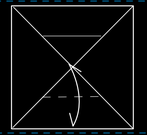
::hypar study:: flexible multi-faceted system
directions of constructing the hypar:: starting with a square

crease the diagonals



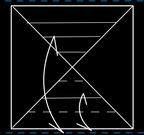
fold the top edge to the centre point, creasing only between the diagonals

unfold

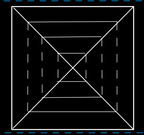


repeat on the bottom [fold and unfold]

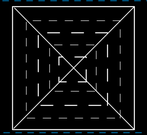
fold and unfold on 1/4 and 3/4 marks



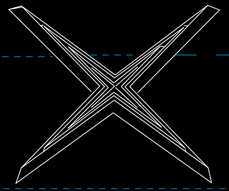
repeat on the bottom



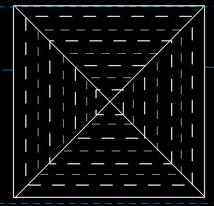
repeat on the left and right sides



turn over, and crease in between the squares in the opposite direction



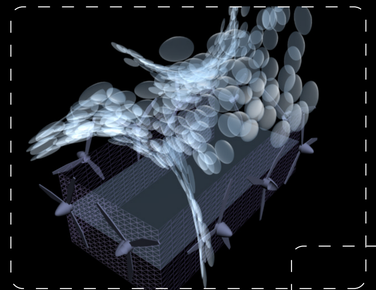
folding the crease pattern completely forms an "X" shape



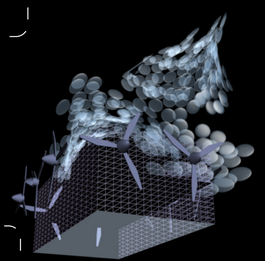
final crease pattern:
valley fold — – –
mountain fold — —

performative roof system
formalism progression ::hypar study::

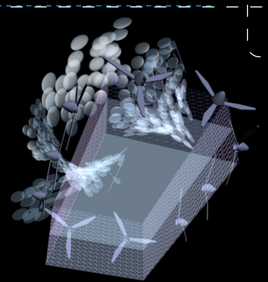
left + below diagrams: represent hypothetic applications of hypar roof system on the propeller barrier flood wall system. the hypar roof system reacts similarly to the investigated hybrid system, with moveable circular pods that formalise a hyperbolic paraboloid. Like the other hybrid systems, these pods shift according to information that is fed into a system through a direct sensory, which are placed on several buoys that monitor the tidal wave shifts, with a direct 10 kilometre radius of the Venice Adriatic lagoon area.



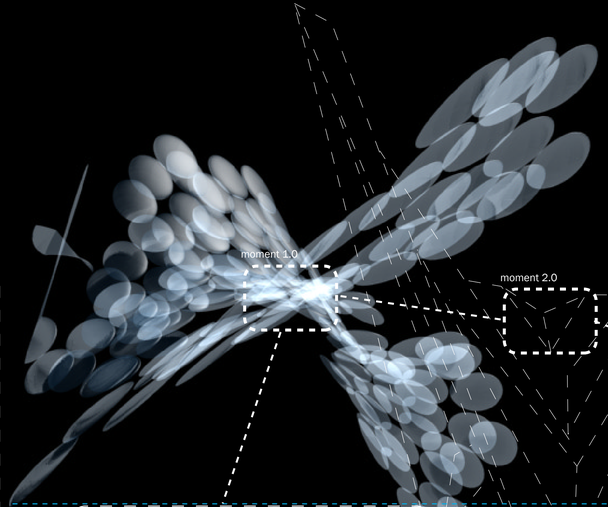
application 1.1



application 1.2



application 1.3

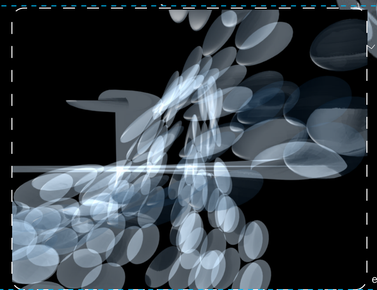


moment 1.0

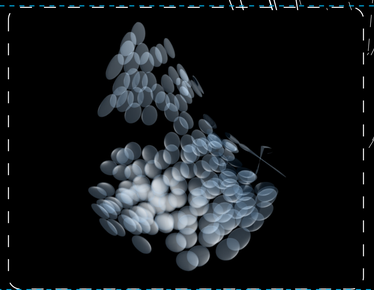
moment 2.0

moment 3.0

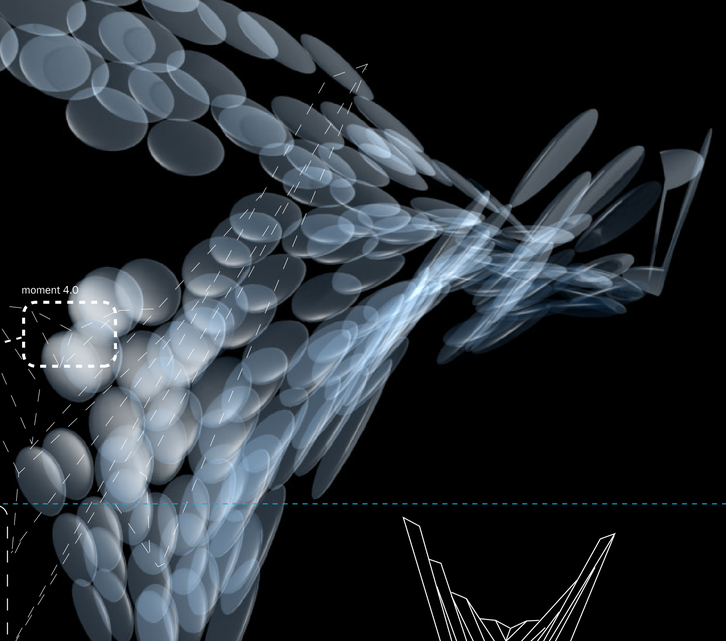
moment 4.0



enlarged detail 1.0



extended perspective 2.0



above: aerial perspective of hypar system

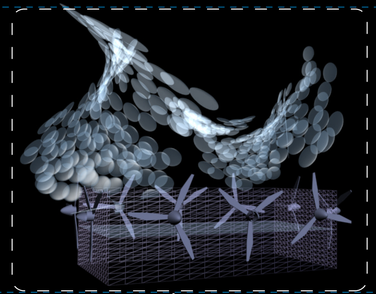
partially opening it forms
a hyperbolic paraboloid [aka: hypar]

performative roof system
formalism progression ::hypar study::

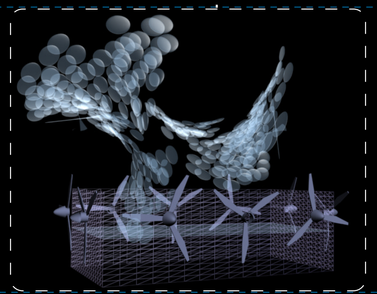
upper + far below diagrams: these sets of diagrams represent the sectional side views of the hypar transformations.

middle section diagrams: these progressional perspective diagrams show the step-by-step transformation of the multi-faceted kinetic roof systems. diagramming the flexibility as different frames of rotations and oscillations. these movements and transformation of the roof depends on the tidal formation of the Venice high + low tides.

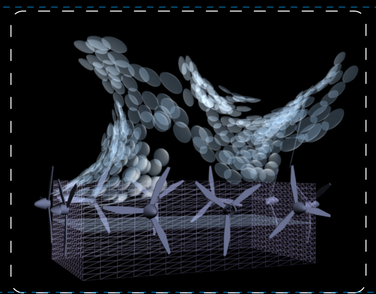
in reality, there will be no 'original' state of the performative roof system, since its operation and progression is based entirely on the dynamism of the Venetian tides. therefore, the shadow/ tones/ coverage of the roof [acting as a pavilion crown] will be depend on the usage and operation; however, more importantly the fluidity of the natural waves which mother-nature produces.



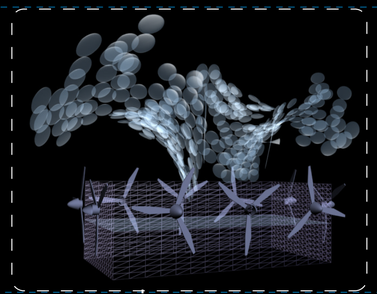
transformation 1.0



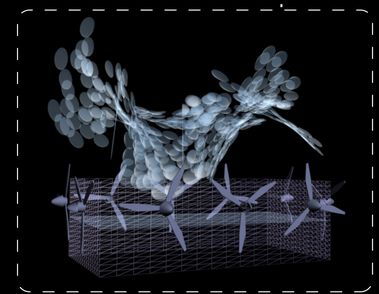
transformation 2.0



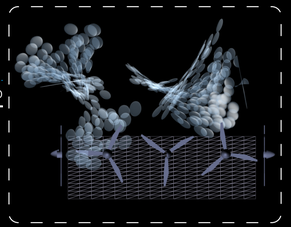
transformation 3.0



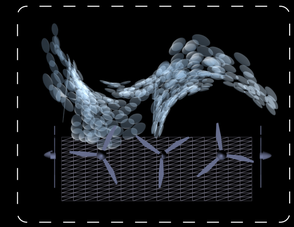
transformation 4.0



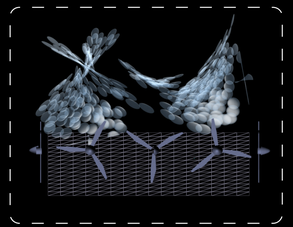
transformation 5.0



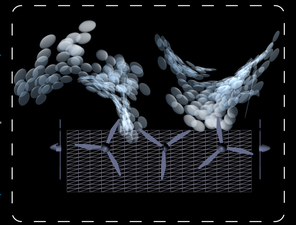
side-view 2.0



side-view 4.0



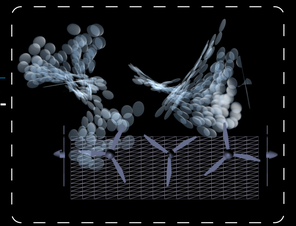
side-view 1.0



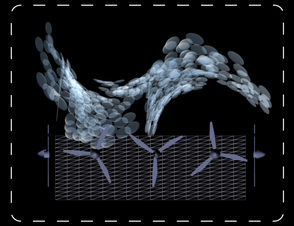
side-view 3.0

performative roof system
::step-by-step:: transformation diagrams

upper + far below diagrams: these sets of diagrams represent the sectional side views of the hypar transformations.



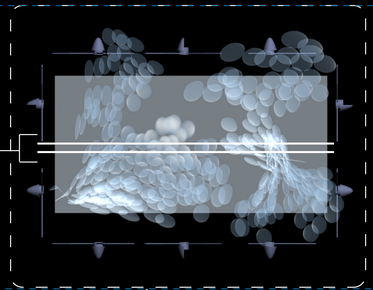
side-view 2.0



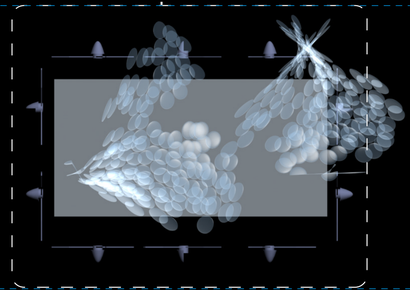
side-view 4.0

middle section diagrams: these transformational diagrams show the multi-faceted flexiblity of how the kinetic roof system rotates/ moves/ oscillates depending on the tidal formation of the Venice high + low tides.

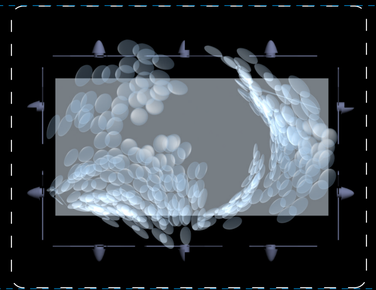
in reality the roof system will only have a singular horizontal central axis structural hinge system, where the two planar hypar roof systems oscillates. this central horizontal hinge, which is formed the middle of the complex, will allow more flexibilty than having the kinetic roof system hinged on the sides of the structure/pavilion.



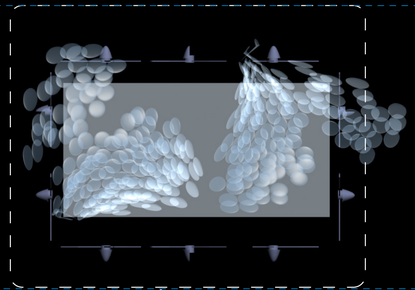
transformation 1.0



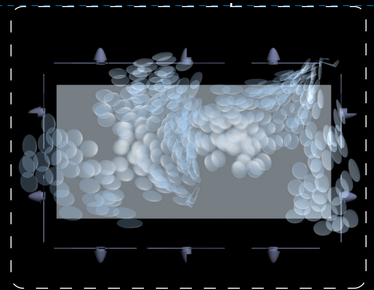
transformation 2.0



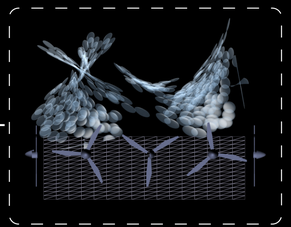
transformation 3.0



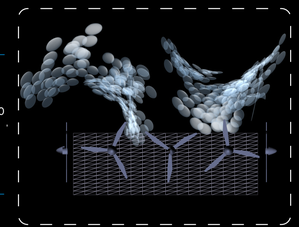
transformation 4.0



transformation 5.0



side-view 1.0



side-view 3.0

performative roof system
::step-by-step:: transformation diagrams