

TENSIONED FABRIC STRUCTURE

Designers : Advanced Structures Inc.

- **Tension fabric structures are one of the most exciting and rapidly developing technologies in the building industry today**
- **Material advances in coated woven textiles combined with design and numerical techniques for developing membrane structures have yielded a new building form for permanent architectural applications**
- **Perhaps the most exciting aspects of fabric structures are the remarkable variety of anticlastic forms that can be realized. These include hyperbolic shapes, saddles, cones, domes, vaults, and waved and plate types. The choices are endless**
- **Cable-membrane structures are referred to as “form active systems” since the form being derived from the direct relationship between force and cable structures. This concept may be referred to as "form follows force".**

Marine World, California



Twin Palms, California



Mission Valley, California







05/07/2002

Chamil
Casual & Classic wear



Design of Tension Fabric Structures

Qualitatively - through physical modeling historically used by designers like Frei Otto to analyze and design membrane structures. Physical modeling involves creating a scaled model made of materials, which depict the actual structure (e.g. textile cloth for the fabric, wire for edge cables etc.). The great advantage of the physical modeling method is the explanation of the physical behavior of the actual structure

Quantitatively - using mathematical tools. Mathematics does not explain physical behavior; it only describes it. However, in recent years, with the help of powerful computers, engineers can easily solve nonlinear equations and track out complex trajectories that cannot be drawn. Mathematical descriptions are now so efficient that powerful computers can easily and fully conceive and explain membrane structure behavior. Computer simulation of the structure has become a valuable tool to help the designer find realistic shapes.

The design of membrane structures regardless of the methods used, as three steps:

- **Form-finding or Initial geometry formulation**
- **Engineering analysis and membrane design**
- **Patterning**

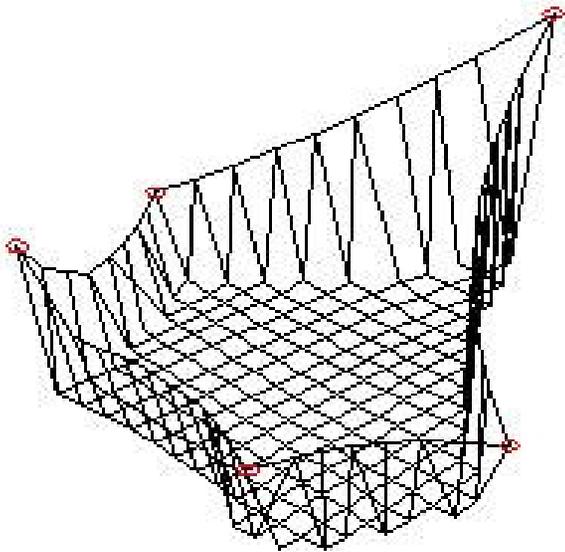


FIGURE 5

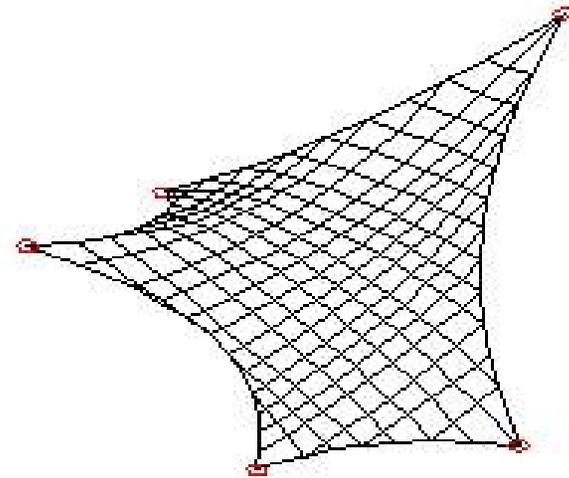


FIGURE 6

Form Finding

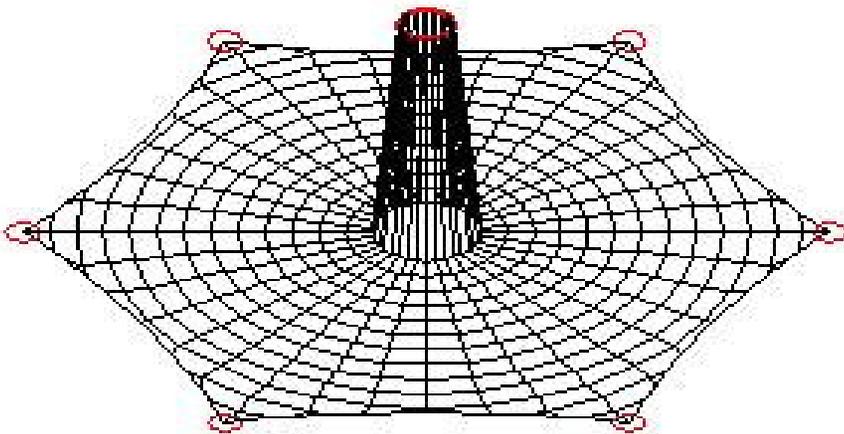


FIGURE 7

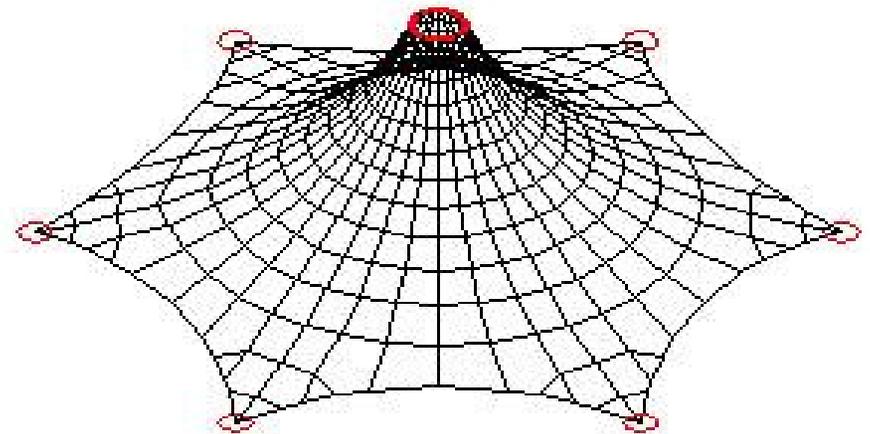
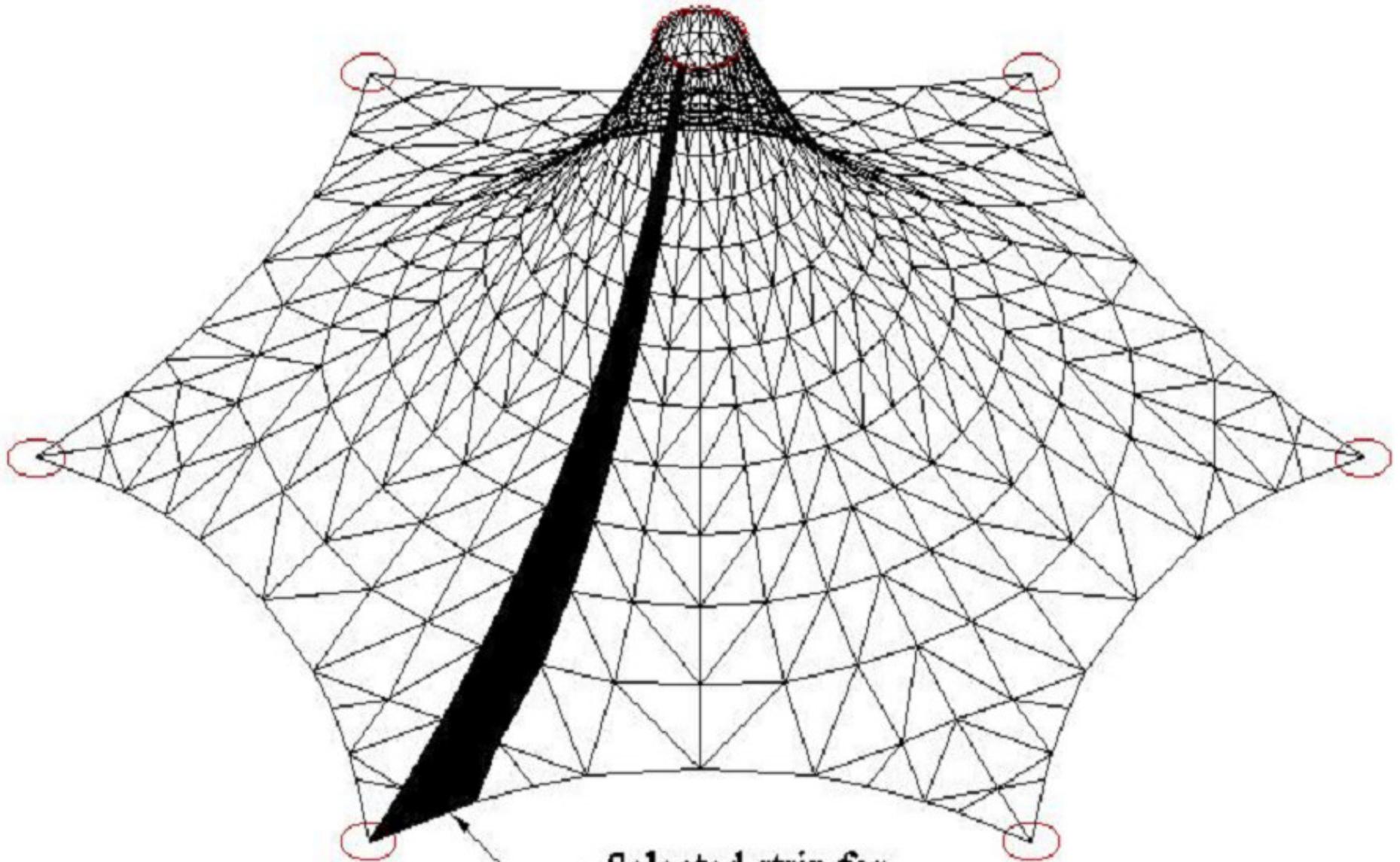


FIGURE 8



Selected strip for flattening

Patterning

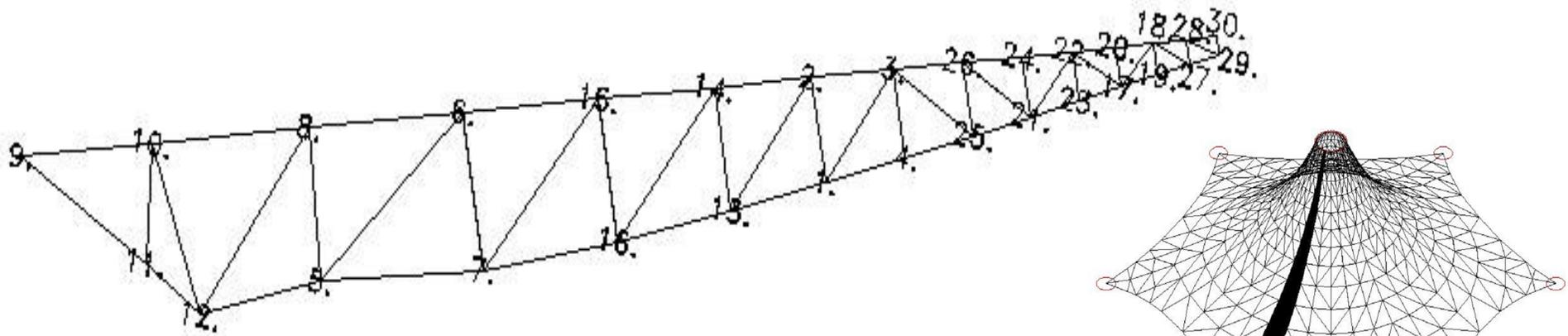


FIGURE 10: Selected strip from 3dface model

Selected strip for flattening
Patterning

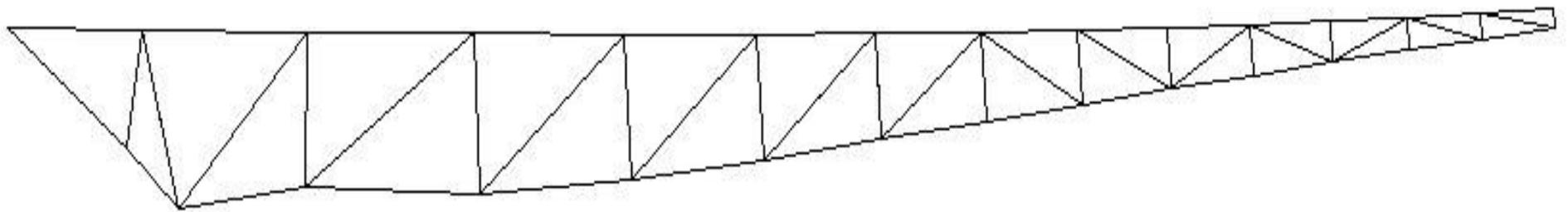


FIGURE 11: Flattened strip (x & y coordinates only)

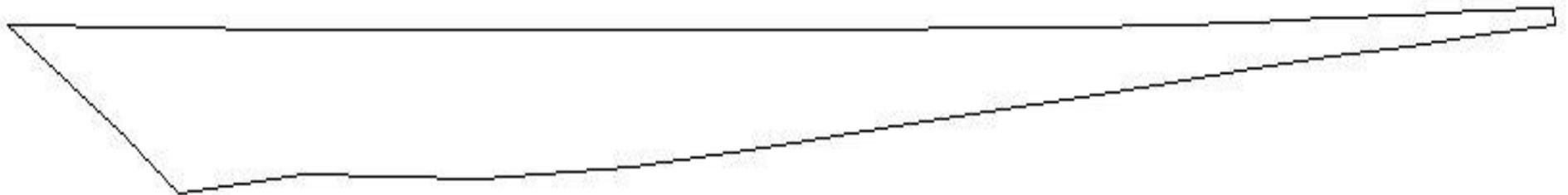


FIGURE 12: Compensated strip for fabrication

THANK YOU