There are 5 types of corners:
1) Corner plate set apart from the fabric, and with the fabric and cables separately adjustable (PVC/Polyester, PTFE/Glass)
2) Corner plate clamped to fabric, cables adjustable (PVC/Polyester, PTFE/Glass)
3) Corner plate connected with keder profile to fabric, cables adjustable or of fixed length (PTFE/Glass)
4) Corner plate clamped to fabric, continuous edge cable (PVC/Polyester)
5) Corner plate, connection with belts (PVC/Polyester)
There are many ways to connect a corner plate to the supporting structure. The choice of a particular solution must take into account the degrees of freedom that are needed by each particular design.

Fig. 5.25 In case of a continuous edge cable often oval clamp plates are used. These plates are connected by use of adjustable U-shaped bolts.

Fig. 5.26 Fabric connected to corner plate by means of a keder profile, the edge cables are adjustable and connected to the membrane by bent straps.

Fig. 5.27 Fabric connected to corner by means of belts
Fig. 5.28  Different examples of belt details, by S.L. Rasch GmbH

Fig. 5.29  Different ways of connecting corner plate to supporting structure
5.6 Base plates

Mast base plates:
- Moment resisting
- Singly hinged
- Ball and socket hinge

Cable base plates
- Moment resisting (A threaded end through a tube is not recommended)
- Singly hinged
- Doubly hinged (Extra toggle added in between cable and base plate)
5.7 Anchorage

The information presented here is largely based upon reference 1 in 5.9.2.

Anchorage is a foundation for tensile forces.

The antecedents of most contemporary anchors can be found in nature, for instance, the roots of plants provide uplift resistance against wind by mobilising the resistance of a large volume of soil. “Sea anchors” attach ships to the seabed. Stakes driven into the ground have been used for anchoring tents such as the “black tent”, the Tabernacle and the circus tent.

Anchors are either “active” (prestressed) or “passive” (deadload) according to whether they are subjected to permanent prestressing or not.

Active anchors are prestressed by initial tensioning against a steel bearing plate or grout lump. The level of prestress is a percentage of the design working load. When the prestressed anchor is externally loaded, it behaves as a much stiffer member than a deadload anchor.

Passive anchors act against the soil only when loaded. They move more than active anchors, but they are simpler and involve fewer problems of relaxation and durability. They can be divided into two main groups according to whether they reach the surface of the ground or are buried. Uplift capacity is provided by four contributions – “plate-effect”, “shaft-effect”, self-weight and earth-pressure. They usually act in combination according to the type and location of the anchor.

For examples on passive anchors see the database:
http://www.upc.es/cai/cai/recerca/tensilestruc/portada.html

Further references are provided in 5.9.2.
5.8 Case Studies

5.8.1 Development of Corner Plates for the Soest Open-Air Theatre

In the corners of a stage covering for the Soest open-air theatre (Figure 5.33), stainless steel castings are used to transfer the membrane forces into the supports. The fluid design of these castings to assure the natural stress flow is shown in Figure 5.34. This choice directly influences the design process. Generally speaking, castings are not economical in small quantities due to the initial cost of making the mould. Furthermore, in membrane structures the geometrical conditions in each corner connection differ from one another as shown in Figure 5.35. This means that each corner plate would need to be designed separately within certain standard principles. In the case of castings a special mould would be necessary for each corner.

The geometrical conditions in the different corner points are shown in Figure 5.35. In this analysis the points are shown in a single plane, simplifying the three dimensional figure of equilibrium obtained by form finding. In plane and modelled as a straight line, both the edge and main span cables are a result of a rotation around one corner point. In this case geometrical deviations perpendicular to the membrane surface are small and therefore such a simplification is allowable.

In Figure 5.36 the next step is shown. In this concept two identical castings are combined to form one corner plate. By a combination of mirroring and mutual rotation, the different geometrical conditions can be met. The cable connections allow small rotations in three directions. Therefore a two dimensional solution of rotating planar cast elements to solve a three dimensional problem is possible.