

# Tendon implementation in SAP2000

On this page:

- [Tendons modeled as loads](#)
- [Tendons modeled as objects](#)
- [Tips](#)

## Tendons modeled as loads

When [tendons](#) are modeled as loads, [SAP2000](#) formulates tendon and structural response according to the process which follows:

1. Structural objects which are subjected to loading from tendons should first be manually assigned to a group. The volume of each object within this group serves as the bounding box within which tendons are embedded. Portions of each tendon may be external to structural objects, details for which are described in the [external tendon](#) article.
2. Tendon loads are calculated as forces which act along tendon profile and exert forces on the structure. When specified, [prestress losses](#) are included in the computation of tendon forces.
3. Tendons are then [discretized](#) into smaller segments. Distributed and concentrated forces are resolved locally within these segments.
4. The software then determines whether or not each discretized segment is located within the bounding box of a structural member which is assigned to the group affected by tendons. If so, tendon loads within that segment are statically transformed, then applied to the [joints](#) of the bounding object.

## Tendons modeled as objects

Alternatively, when tendons are modeled as structural objects, formulation proceeds as follows:

1. Structural objects which are subjected to loading from tendons should first be manually assigned to a group. The volume of each object within this group serves as the bounding box within which tendons are embedded. Portions of each tendon may be external to structural objects, details for which are described in the [external tendon](#) article.
2. Tendon loads are calculated as forces which act along tendon profile and exert forces on the structure. When specified, [prestress losses](#) are included in the computation of tendon forces.
3. Tendons are then [discretized](#) into smaller segments. Discretization points are located at either end of each discretization segment. When located within the bounding box of a structural member, [interpolation constraints](#) connect these discretization points to all [joints](#) within that member. Coarsely discretized tendons which span a series of relatively smaller objects may not connect analytically to every object through which they pass.
4. Axial strain (s11) is then calculated and applied to each discretized segment. The tension at either end of each tendon object is converted into equivalent strains which occur along tendon length, and transfer to the structure as strain load. This application is not affected by whether or not the tendon is contained within the bounding object.

## Tips

- Tension and prestress loss which develop along tendon length may be viewed graphically through Display > Show Load > Tendons > Show Calculated Values.