ALPINE TruSteel™

Symmetry

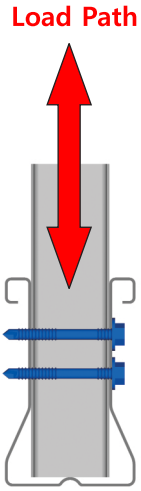
"The mathematical sciences particularly exhibit order, symmetry and limitation; and these are the greatest forms of the beautiful."

Aristotle
Ancient Greek Philosopher, 384 BC-322 BC

Symmetry Equals Strength

Cold-formed steel structural members are designed in accordance with the "North American Specification for the Design of Cold-Formed Steel Structural Members" (AISI S100). Slender structural members that are subjected to axial compression, such as load-bearing studs and most truss members, must be designed to resist up to four types of stresses due to buckling. The physical shape of the member can nullify many of these buckling modes via symmetry. Simply stated, symmetrical cross-sectional shapes have higher load-carrying capacity than non-symmetric members.

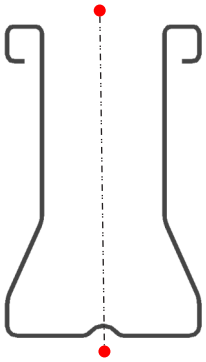
Symmetry in Truss Members



Trusses are composed of chords and webs that act together to create a structural component capable of supporting specific enviornmental loads (snow, gravity, wind and seismic) and dead loads as specified by the building designer. Symmetry of truss members provides a superior product in both design and field application.

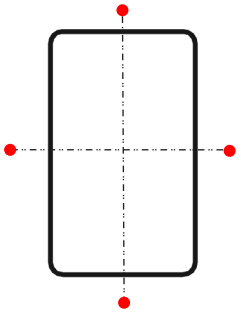
- Symmetric U-shaped chord members do not subject fasteners to eccentricity,
- Symmetric web members not subject to torsional bucking require less field-installed bracing,
- Symmetric Z-Web has been designed so its principle axis is the same as the X-Y axis, thus alleviating principle axis buckling.
- Symmetrical U-Shaped chord members create a safer maneuvering landscape for the installation contractor than shapes such as cees and zees,
- Most symmetrical shapes generally have return lips, eliminating sharp edges and in turn delivering a safer product to the field,
- TrusSteel's symmetric system weight is much less than unsymmetrical systems.

TrusSteel Chord



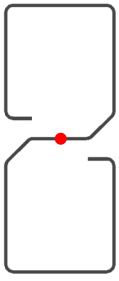
Singly Symmetric

TrusSteel Welded Tube Web



Doubly Symmetric

TrusSteel Roll Formed Z-Web



Point Symmetric

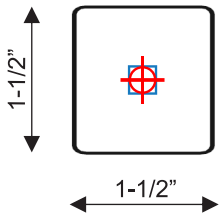
ALPINE TrusSteel™

Symmetry by the Numbers

Practical Applications of Symmetry

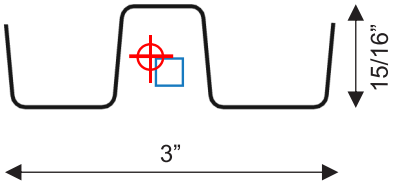
To illustrate the importance of shape and symmetry, the two examples below compare TrusSteel web members to competitive products. The comparisons shown below are manufactured using virtually the same amount of steel. Notice how the Center of Gravity □ and Shear Center ⊕ on TrusSteel's symmetrical web members coincide at the same location. This innovative design feature utilizes symmetry to eliminate torsional bucking, which in turn delivers strength. Pound for pound, in these examples, TrusSteel's web members are 98% stronger than its direct competitors'.

Example #1 - Tube vs. Proprietary Section



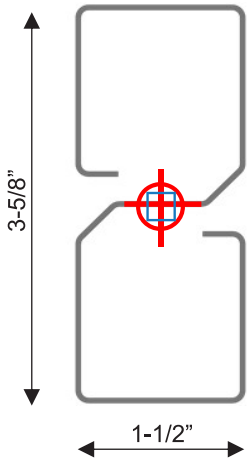
TrusSteel 33W1.5x1.5 Web Member

33W1.5x1.5		30USW035
0.033	Steel Thickness (in.)	0.035
45	Steel Yield Strength (ksi)	50
0.70	Weight (lb./ft.)	0.72
3,274	4'-0" Unbraced Web Capacity (lbs.)	1,266
1,928	6'-0" Unbraced Web Capacity (lbs.)	625
1,085	8'-0"' Unbraced Web Capacity (lbs.)	352



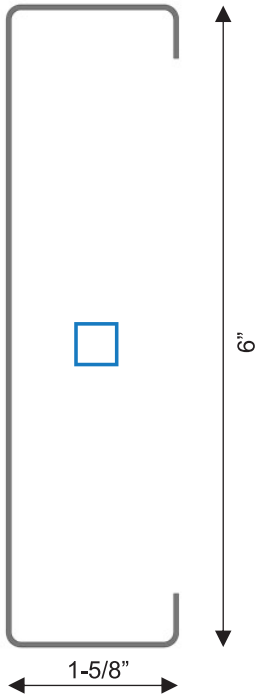
Competitive 30USW035 50 Web Member

Example #2 - Z-Web vs. Cee Section



TrusSteel 43Z1.5x3.62 Web Member

43Z1.5x3.62		600S162-46
0.043	Steel Thickness (in.)	0.046
40	Steel Yield Strength (ksi)	50
1.69	Weight (lb./ft.)	1.63
4,956	6'-0" Unbraced Web Capacity (lbs.)	3,267
2,845	8'-0" Unbraced Web Capacity (lbs.)	2,047
1,820	10'-0" Unbraced Web Capacity (lbs.)	1,423
3,711	14' Web with Brace Capacity (lbs.)	1,100



Competitive 600S162-46 50 ksi Cee Web