

Calculation of welded connections

i Project information

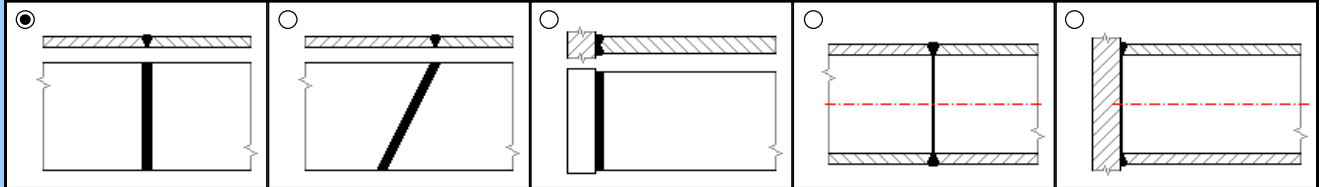
Input section

1.0 Basic parameters of the calculation, connection material

1.1 Calculation units	Imperial (lb, in, HP...)		1.9 Material of the connected parts	
1.2 Used calculation method			1.10 Material standard	ASTM
1.3 <input checked="" type="radio"/> Basic calculation method			1.11 Structural steel ASTM A27 Grade 60-30	<input checked="" type="checkbox"/>
1.4 Required safety against yield point	FSy	2.00	1.12 Ultimate tensile strength	Su 60 [ksi]
1.5 <input type="radio"/> Method of conversion coefficients			1.13 Yield strength	Sy 30 [ksi]
1.6 Required safety against yield point	FSy	1.50		
1.7 <input type="radio"/> Method of permissible stresses				
1.8 Required safety factor	FS	1.00		

2.0 Butt welds

2.1 Connection type : Connection of flat plates using end weld



2.2 Dimensions of the connection

2.3 Plate thickness	s	0.2500	[in]
2.4 Plate width	L	10.0000	[in]

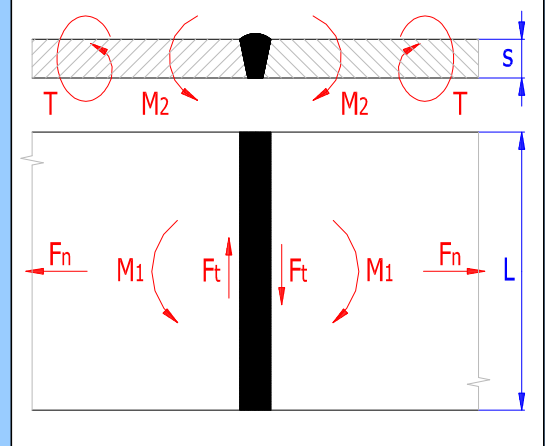
2.7 Loading of the connection

2.8 <input checked="" type="checkbox"/> Normal force	Fn	400.000	[lb]
2.9 <input checked="" type="checkbox"/> Tangential force	Ft	200.000	[lb]
2.10 <input checked="" type="checkbox"/> Bending moment	M1	20.000	[lb ft]
2.11 <input checked="" type="checkbox"/> Bending moment	M2	15.000	[lb ft]
2.12 <input checked="" type="checkbox"/> Torque	T	15.000	[lb ft]

2.13 Strength checks of the connection

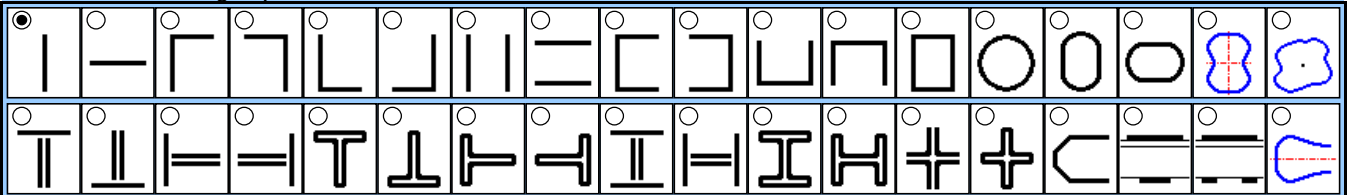
2.14 Yield strength	Sy	30.0	[ksi]
2.15 Permissible stress	Sa	15.00	[ksi]
2.16 Equivalent stress	Sw	2.61	[ksi]
2.17 Safety against yield point		11.51	

2.6 Only the effective weld length is considered



3.0 Fillet welds loaded in the connection plane (Lap joints)

3.1 Form of weld group



3.2 Dimensions of the connection

3.3 Weld throat thickness	a	0.2500	[in]
3.4 Weld length	L	5.0000	[in]

3.8 Standard profiles

3.9 Profile type	
3.10 Profile dimensions	

3.11 Parameters of the connection

3.12 <input checked="" type="checkbox"/> Only the effective weld length is considered
3.13 <input type="checkbox"/> The parts are connected using internal weld

3.15 Loading of the connection

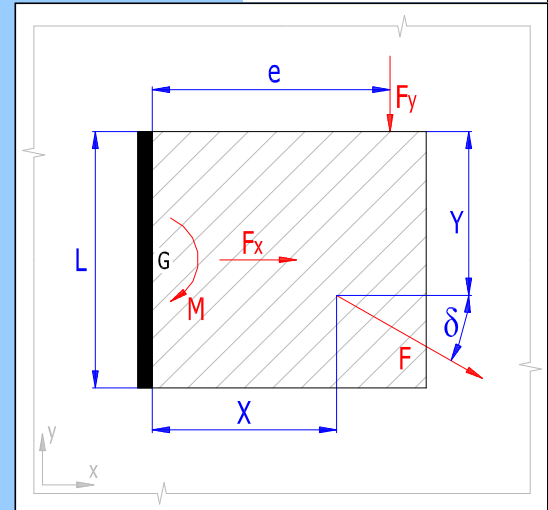
3.16 <input checked="" type="checkbox"/> Shear force	Fx	200.000	[lb]
3.17 <input checked="" type="checkbox"/> Bending force	Fy	200.000	[lb]
3.18 Force arm	e	2.500	[in]
3.19 <input checked="" type="checkbox"/> Common force	F	200.000	[lb]
3.20 Direction angle of acting force	delta	30.000	[°]
3.21 X-coordinate of force action point	X	2.500	[in]
3.22 Y-coordinate of force action point	Y	2.500	[in]
3.23 <input checked="" type="checkbox"/> Bending moment	M	20.000	[lb ft]

3.24 Strength checks of the connection

3.25 Yield strength	Sy	30.0	[ksi]
3.26 Permissible stress	Sa	15.00	[ksi]
3.27 Shear stress	Sw	1.57	[ksi]
3.28			
3.29			
3.30			
3.31 Safety against yield point		19.13	

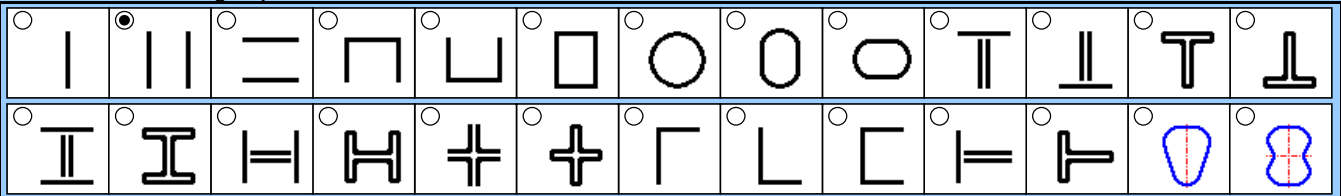
3.14 Joint design

Single-shear joint



4.0 Fillet welds loaded in the plane perpendicular to the connection plane (T-joints)

4.1 Form of weld group



4.2 Dimensions of the connection

4.3 Weld throat thickness	a	0.2500	[in]
4.4 Beam height	H	5.0000	[in]
4.5 Beam width	B	2.5000	[in]
4.6			
4.7			

4.8 Standard profiles

4.9 Profile type	S steel shape [ASTM/AISI/AISC]
4.10 Profile dimensions	S 3 x 5.7

4.11 Parameters of the connection

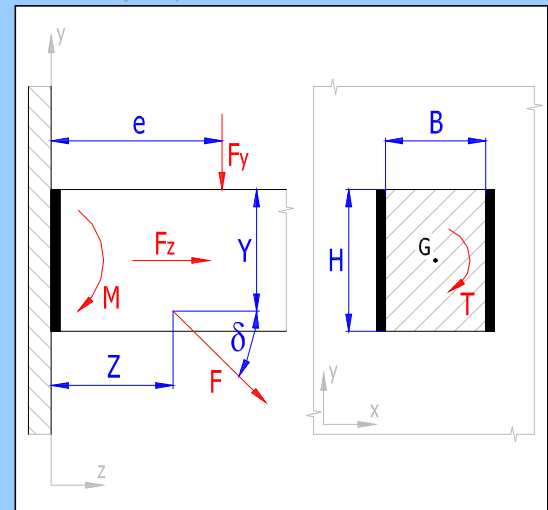
- 4.12 Only the effective weld length is considered
- 4.13 Only the positive stress value is considered

4.14 Loading of the connection

4.15 <input checked="" type="checkbox"/> Axial force	Fz	400.000	[lb]
4.16 <input checked="" type="checkbox"/> Bending force	Fy	200.000	[lb]
4.17 Force arm	e	2.500	[in]
4.18 <input checked="" type="checkbox"/> Common force	F	200.000	[lb]
4.19 Direction angle of acting force	delta	30.000	[°]
4.20 Z-coordinate of force action point	Z	2.500	[in]
4.21 Y-coordinate of force action point	Y	1.000	[in]
4.22 <input checked="" type="checkbox"/> Bending moment	M	40.000	[lb ft]
4.23 <input checked="" type="checkbox"/> Torque	T	20.000	[lb ft]

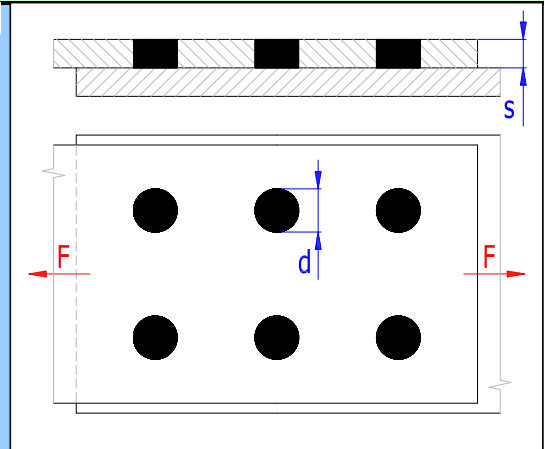
4.24 Strength checks of the connection

4.25 Yield strength	Sy	30.0	[ksi]
4.26 Permissible stress	Sa	15.00	[ksi]
4.27 Equivalent stress	Sw	1.15	[ksi]
4.28			
4.29 Safety against yield point		26.04	



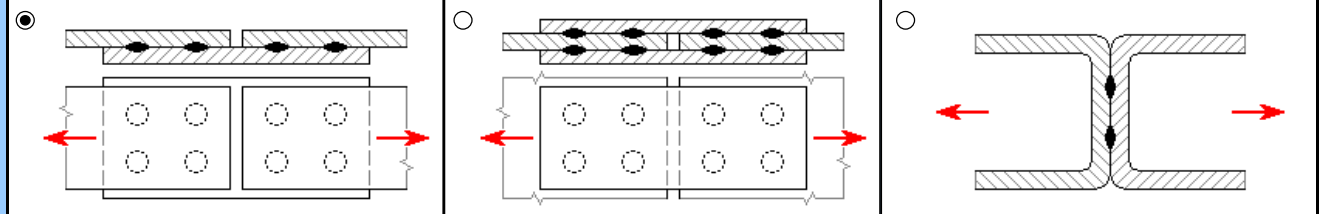
5.0 Plug and slot welds

5.1 Connection type	Lap joints with plug welds	
5.2 Dimensions of the connection		
5.3 Number of welds	i	4
5.4 Plate thickness	s	0.2500 [in]
5.5 Plug weld diameter	d	0.2500 [in]
5.6		
5.7 Loading of the connection		
5.8 Shear force	F	2000.000 [lb]
5.9 Strength checks of the connection		
5.10 Yield strength	Sy	30.0 [ksi]
5.11 Permissible stress	Sa	15.00 [ksi]
5.12 Shear stress in the weld bottom area	Swb	10.19 [ksi]
5.13 Shear stress in the weld peripheral area	Swp	2.55 [ksi]
5.14 Safety against yield point		2.95



6.0 Spot (resistance) welds

6.1 Connection type : Single-shear lap joints with spot welds subjected to shear



6.2 Dimensions of the connection		
6.3 Number of welds	i	4
6.4 Plate thickness	s	0.1250 [in]
6.5 Spot weld diameter	d	0.3750 [in]
6.6 Loading of the connection		
6.7 Shear force	Fs	2000.000 [lb]
6.8 Strength checks of the connection		
6.9 Yield strength	Sy	30.0 [ksi]
6.10 Permissible stress	Sa	15.00 [ksi]
6.11 Shear stress in the weld throat area	Swa	4.53 [ksi]
6.12 Shear stress in the weld cylindrical area	Swc	3.40 [ksi]
6.13 Safety against yield point		6.63

