30/9/2014

Common formulas / US

→ Weight of weld = A/c to geometry. (lbs)

→ Weight of filler required = $\frac{\text{weight of weld}}{\text{Process eff.}}$ (lbs)

→ Arc on Hours = $\frac{\text{Weight of weld}}{\text{Process eff.} \times \text{Deposition rate}}$ (Hr)

→ Labour Hours = $\frac{\text{Arc on Hours}}{\text{Welder eff.}}$ (Hr)

→ Total filler cost = weight of filler required (lb) × filler cost ($/lb) ($)

→ Labour cost = Labour Hours × Labour Rate ($)

→ Total Gas cost = Arc on hour × gas flow rate × Gas cost

→ power cost = $\frac{\text{Amp.} \times \text{volt} \times \text{Arc on Hours} \times \text{Power cost}}{1000.}$

→ Total cost = Total filler cost + labour cost + Total Gas cost + Power cost.

29/9/2014

Welding cost estimation's.

Fillet weld

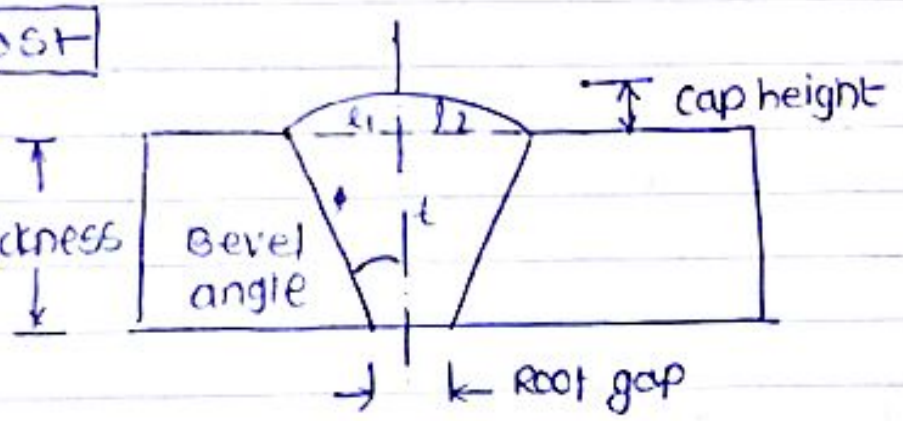
$$\text{Weight of weld} = \underbrace{0.5 \times (\text{leg size})^2 \times \text{length} \times \text{No. of joint} \times \text{filler density}}_{A} + A \times (\text{size variation \%})$$

Deposition rate :-

$$= 3.14159 \times \left(\frac{\text{wire dia}}{2}\right)^2 \times \left(\frac{\text{wire feed} \times 60}{\text{speed}}\right) \times \text{filler density}$$

Single vee weld cost

- Bevel ange (degree)
- Thickness (in.)
- Root Gap (in)
- Cap height (in.)



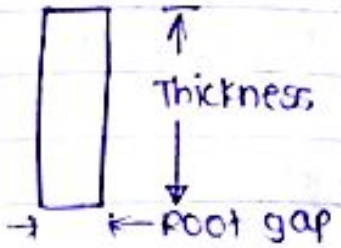
Weight of weld :-

$$\text{Radian angle} = \text{degree}^\circ \times \frac{3.14159}{180} \text{ rad.}$$

$$\tan\theta = \frac{l_1}{t} \Rightarrow \text{tangent length } (l_1) = t \tan\theta$$

$$\text{Area}_1 = \frac{l_1 \times \text{thickness}}{2}, \quad A_2 = \frac{l_2 \times \text{thickness}}{}$$

A_3 = Rootgap x thickness

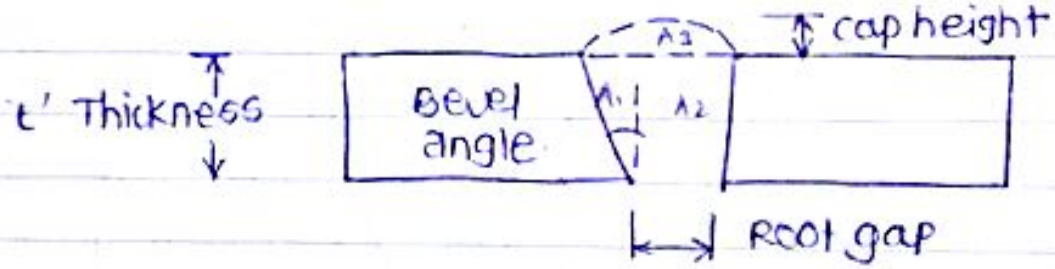


Cap area A_4 = 0.72 x Cap height x Cap width

Cap width = (l_1 + Root gap + l_2)

Weight of weld = ($A_1 + A_2 + A_3 + A_4$) x length x filler density

Single Bevel



A_1 = $\frac{t \tan\theta \times t}{2}$, A_2 = Thickness (t) x Root gap

A_3 = 0.72 x cap height x cap width

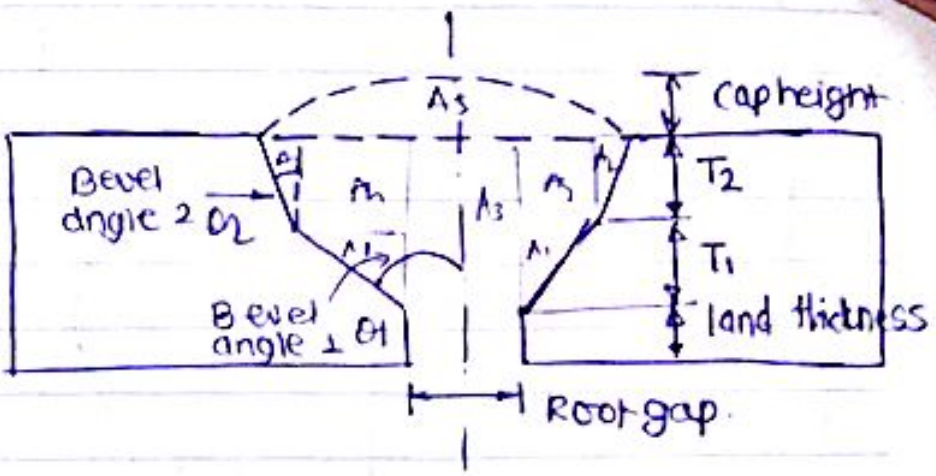
cap width = ($t \tan\theta$ + Root gap)

Volum of weld = ($A_1 + A_2 + A_3$) x length x No. of joints.

weight of weld = ($A_1 + A_2 + A_3$) x length x density of filler.

Compound Vee

- Joint length (in)
- Quantity of joint
- T_1 thickness (in)
- T_2 thickness (in)
- Bevel angle 1 (deg)
- Bevel angle 2 (deg)
- Land thickness (in)
- Root gap (in)
- Cap height.



$$A_1 = \frac{T_1 \tan\theta_1 \cdot T_1}{2} \times 2 = (T_1)^2 \tan\theta_1 \quad \text{in}^2$$

$$A_2 = \frac{T_2 \tan\theta_2 \cdot T_2}{2} \times 2 = (T_2)^2 \tan\theta_2 \quad \text{in}^2$$

$$A_3 = \text{Root gap} \times (T_1 + T_2 + \text{land thickness}) \quad \text{in}^2.$$

$$A_4 = 2 \times T_2 \times (T_1 \tan\theta_1)$$

$$\text{Cap width} = T_2 \tan\theta_2 \times 2 + T_1 \tan\theta_1 \times 2 + \text{Root gap}.$$

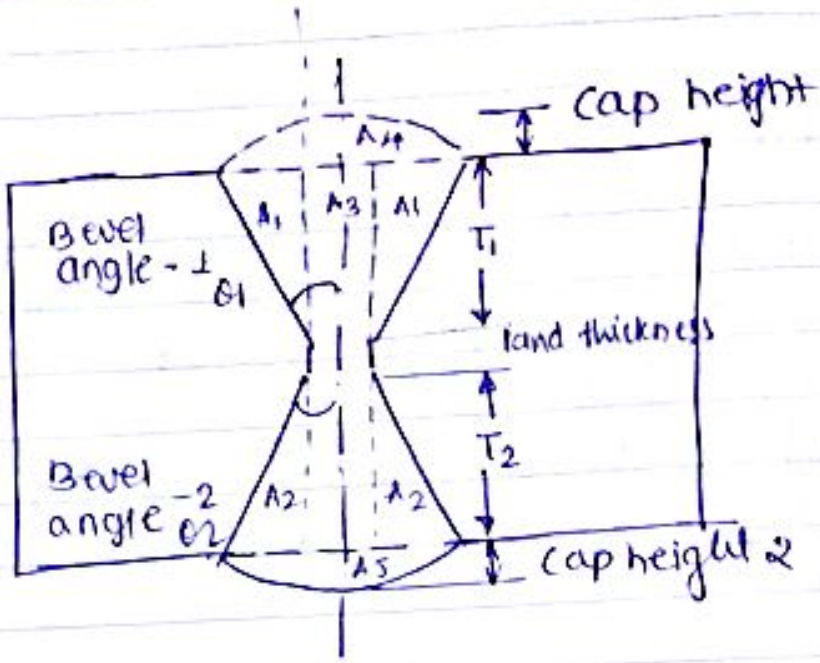
$$A_5 = \text{cap height} \times \text{cap width} \times 0.8$$

$$\text{Volume} = (A_1 + A_2 + A_3 + A_4 + A_5) \times \text{Joint length} \times \text{No. of joints}.$$

$$\text{Weight of weld} = \text{Volume} \times \text{filler density} \quad (\text{lbs}).$$

Double Vee

- Bevel angle 1
- Bevel angle 2
- cap height 2
- cap height 1
- T_1 thickness
- T_2 thickness
- land thickness
- joint length
- No. of joints
- Root gap



$$A_1 = \frac{T_1 \tan\theta_1 \; T_1}{2} \times 2 = (T_1)^2 \tan\theta_1$$

$$A_2 = \frac{T_2 \tan\theta_2 \cdot T_2}{2} \times 2 = (T_2)^2 \tan\theta_2$$

$$A_3 = \text{Root gap} \times (T_1 + T_2 + \text{land thickness})$$

$$A_4 = \text{cap height 1} \times \text{cap width 1} \times 0.8$$

$$A_4 = \text{cap height 1} \times (2\, T_1 \tan\theta_1 + \text{Root gap}) \times 0.8$$

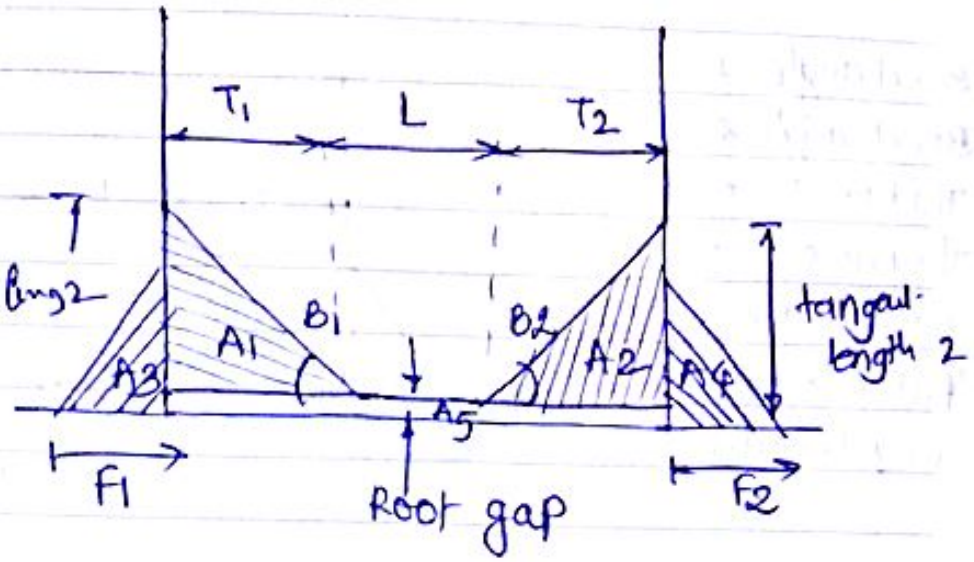
$$A_5 = \text{cap height 2} \times (2\, T_2 \tan\theta_2 + \text{Root gap}) \times 0.8$$

$$\text{Volume} = (A_1 + A_2 + A_3 + A_4 + A_5) \times \text{joint length} \times \text{No. of joints}$$

$$\text{Wt. of weld} = \text{volume} \times \text{filler density.} \quad (\text{lbs})$$

Double Bevel Tee groove

Bevel angle 1
Bevel angle 2
Thickness-1 (T_1)
Thickness-2 (T_2)
Fillet size-1
Root gap
Fillet size-2
No. of joint.
Land thickness



θ_{r_1} Angle in radian $= B_1 \cdot \frac{3.14159}{180}$ rad.

$\theta_{r_2} = B_2 \times \frac{3.14159}{180}$ rad.

Tangent length-1 $= T_1 \times \tan\theta_{r_1}$

—11— 2 $= T_2 \times \tan\theta_{r_2}$

$A_1 = \frac{1}{2}(T_1)^2 \tan\theta_{r_1}$

$A_2 = \frac{1}{2}(T_2)^2 \tan\theta_{r_2}$

$A_3 = \frac{1}{2}(\text{fillet size 1})^2$

$A_4 = \frac{1}{2}(\text{fillet size 2})^2$

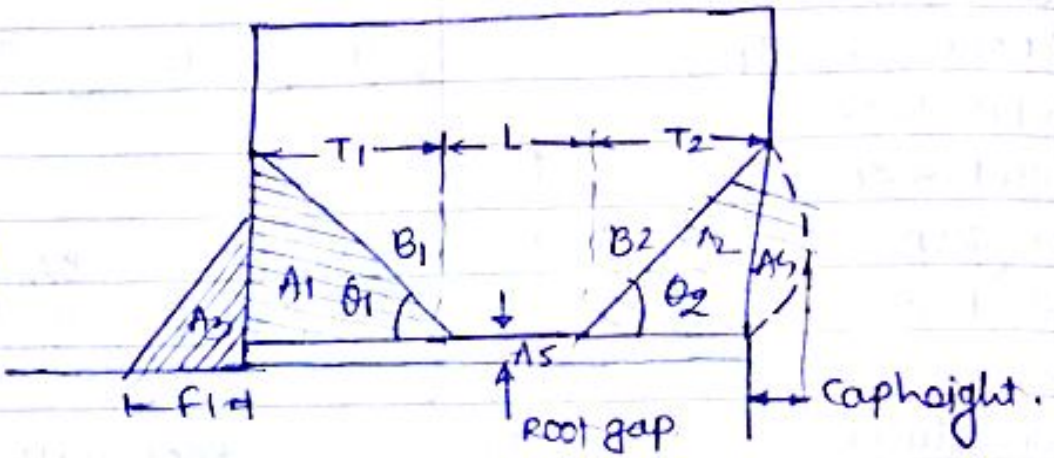
$A_5 = \text{Root gap} \times (T_1 + L + T_2)$

Volume $= (A_1 + A_2 + A_3 + A_5) \times$ Joint length $\times$ No. of joints

Wt. of weld = volume $\times$ filler density.

Double Bevel corner groove weld

Bevel angle 1
Bevel angle 2
Thickness - T_1
Thickness - T_2
Long thickness (L)
Fillet size
Cap height.



$$A_1 = \frac{1}{2} (T_1)^2 \tan\theta_1$$

$$A_2 = \frac{1}{2} (T_2)^2 \tan\theta_2$$

$$A_3 = \frac{1}{2} (\text{leg size})^2$$

$$A_4 = \text{Cap height} \times (T_2 \tan\theta_2 + \text{Root gap})$$

$$A_5 = \text{Root gap} \ (T_1 + L + T_2)$$

$$\text{Volume} = (A_1 + A_2 + A_3 + A_4 + A_5) \times \text{joint length} \times \text{No. of joints.}$$

$$\text{Weight of weld} = \text{Volume} \times \text{filler density.}$$