

# CONSUMABLE ESTIMATION

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Weight of weld metal

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# OUTLINE

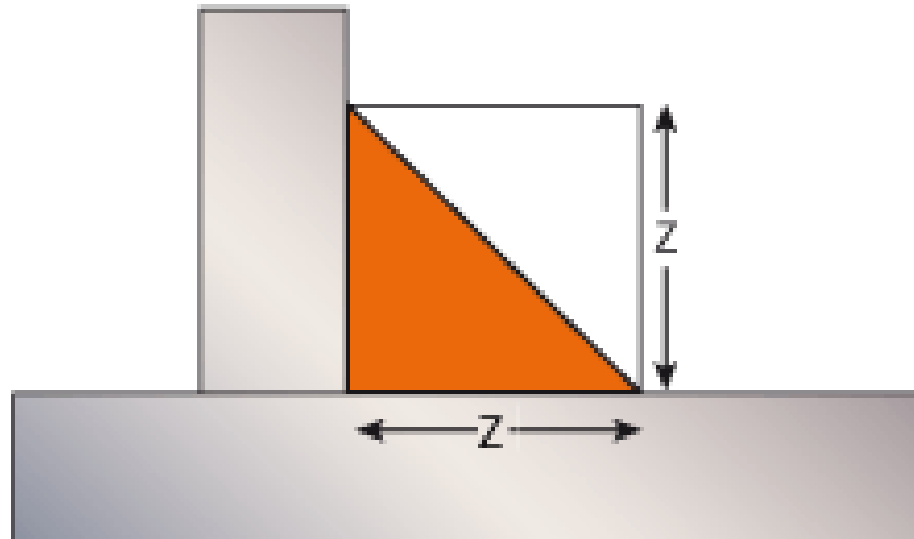
- *Equal leg length fillet weld*
- *Unequal leg length fillet*
- *Single-V butt weld*
- *Single 'U' preparation*

# SHORT FORM

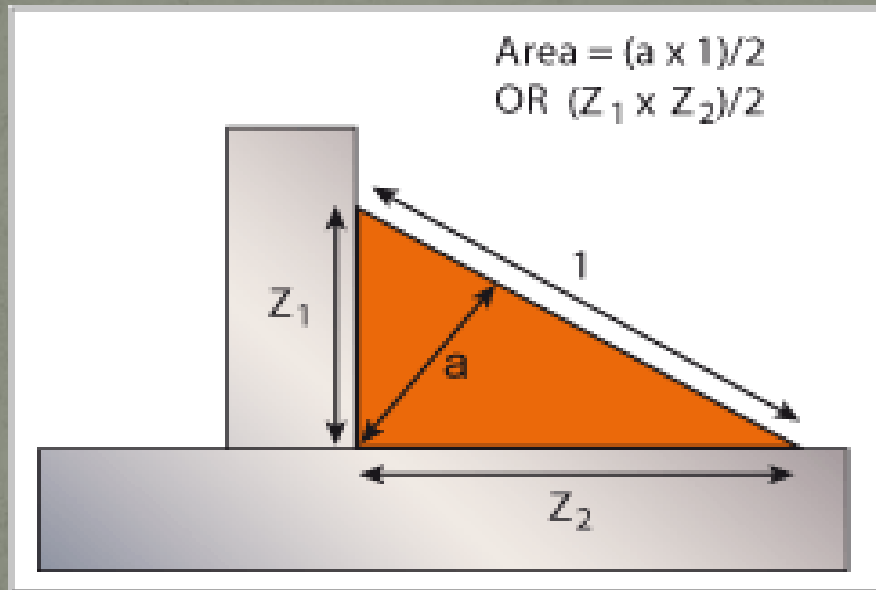
- Cross section area
- Volume of weld =  $A \times L$
- Weight of the weld metal =  $V \times \text{Density}$

# *Equal leg length fillet weld*

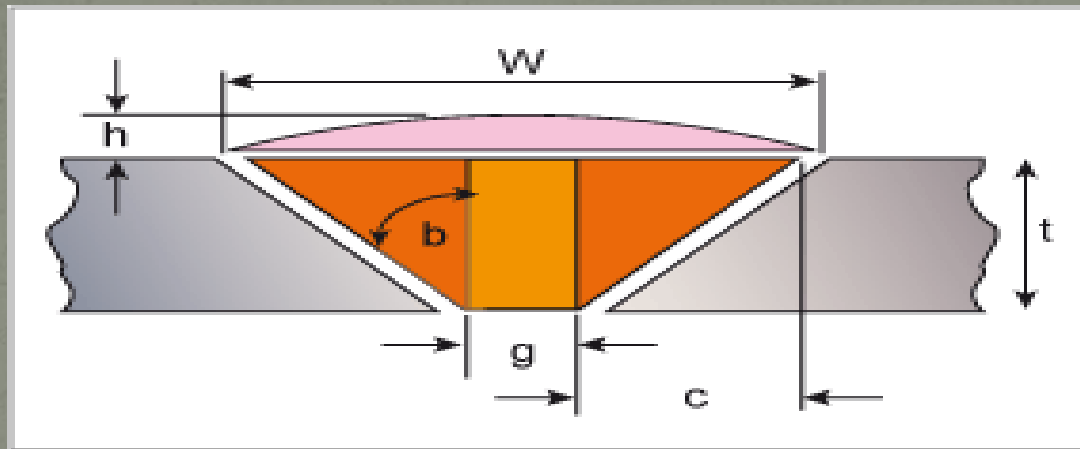
$$\text{Area} = Z^2/2$$



# Unequal leg length fillet



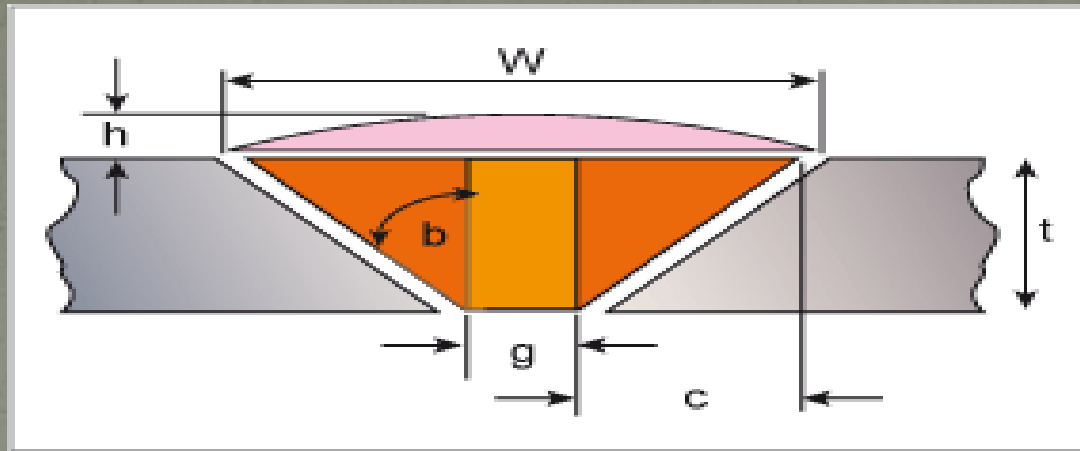
# Single-V butt weld



'c' is given by =  $(\tan b \times t)$   
Single red triangle =  $t(\tan b \times t)/2$

calculated using the formula  
 $2t(\tan b \times t)/2$   
or  
 $t(\tan b \times t)$ .

# Single-V butt weld



Area of the excess weld metal =  $(W \times h)/2$

The width of the weld cap  $W = 2(\tan b \times t) + g$

Area provided by the root gap =  $g \times t$ .

Bevel angles,  $b$ ,  
most often used are

$10^\circ = (\tan 0.176)$ ,

$15^\circ = (\tan 0.268)$ ,

$22.5^\circ = (\tan 0.414)$

$32.5^\circ = (\tan 0.637)$

$45^\circ = (\tan 1.00)$

# Density of some of the more common alloys

Alloy	Density (gm/cm <sup>3</sup> )
Iron	7.87
0.25% carbon steel	7.86
12%Cr steel	7.70
304 stainless steel	7.92
Nickel	8.90
80/20 Ni.Cr	8.40
625 type alloy	8.44
Copper	8.94
70/30 brass	8.53
7% Al bronze	7.89
Aluminium	2.70



# Single-V butt weld

worked example, if the weld is in a plate 2.5cm thickness, 0.3cm root gap, 65° included angle ( $b = 32.5^\circ$ ;  $\tan 32.5^\circ = 0.637$ ) and with a cap height of 0.2cm we have

$$C = (\tan b \times t)$$

$$C = \tan 32.5 \times 2.5 = 0.637 \times 2.5 = 1.59\text{cm}$$

$$\begin{aligned}\text{The width of the weld cap } W &= 2(\tan b \times t) + g \\ &= 2(0.637 \times 2.5) + 0.3 \\ &= 3.485\text{cm}\end{aligned}$$

$$\begin{aligned}\text{Area of the cap} &= (W \times h)/2 \\ &= (3.485 \times 0.2)/2 \\ &= 0.348 \text{ sq. cm.}\end{aligned}$$

$$\begin{aligned}\text{Area of the root gap area} &= g \times t \\ &= 0.3 \times 2.5 \\ &= 0.75 \text{ sq.cm.}\end{aligned}$$

$$\begin{aligned}\text{Area of the two red areas} &= 2t(\tan b \times t)/2 \\ &= 2 \times (1.59 \times 2.5)/2 \\ &= 3.97 \text{ sq.cm.}\end{aligned}$$

$$\text{Total area} = 5.07 \text{ sq cm}$$

# *Single-V butt weld*

Total area = 5.07sq cm

1 sq cm = 100 cu.cm

Area = 507 cu.cm

Volume of weld =  $A \times L$

$L = 1\text{m}$

Volume of weld =  $507 \times 1$

= 507 cu. cm/metre

Weight of the weld metal =  $V \times \text{Density}$

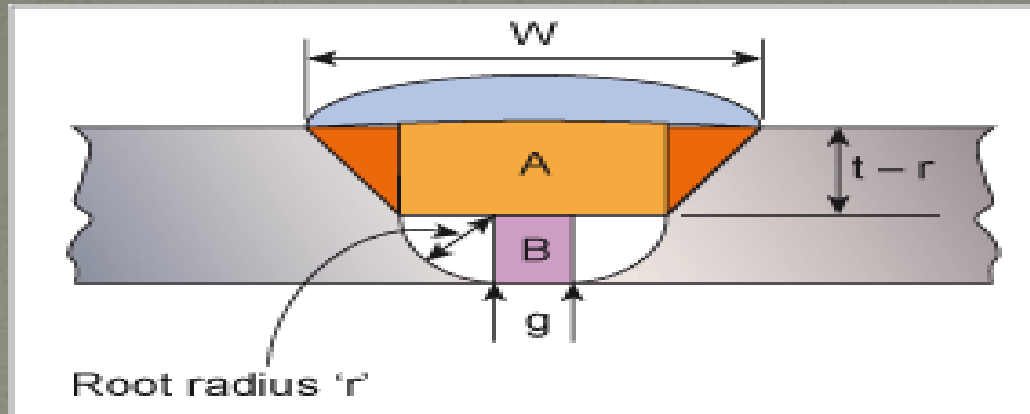
Carbon steel =  $(507 \times 7.86)$

= 3985gms or 3.98kgs/metre

Double sided V-joints uses

dividing the weld into its individual 'V's and adding the products

# Single 'U' preparation



'c' is given by  $(\tan b \times (t-r))$

Area of the two red areas =  $2((t-r)(\tan b \times (t-r)))/2$   
or  $((t-r)(\tan b \times (t-r))$

Width of the weld cap  $W = 2(\tan b \times (t-r)) + g + 2r$

Area of the cap =  $(W \times h)/2$

Area 'A' is  $(t-r) \times (2r + g)$ .

Area 'B' is  $g \times r$ .

Root radius area is  $(\pi r^2)/4$

Double sided U-joints uses

dividing the weld into its individual 'U's and adding the products

THANK YOU