Use of prototype Sheet for Element Design

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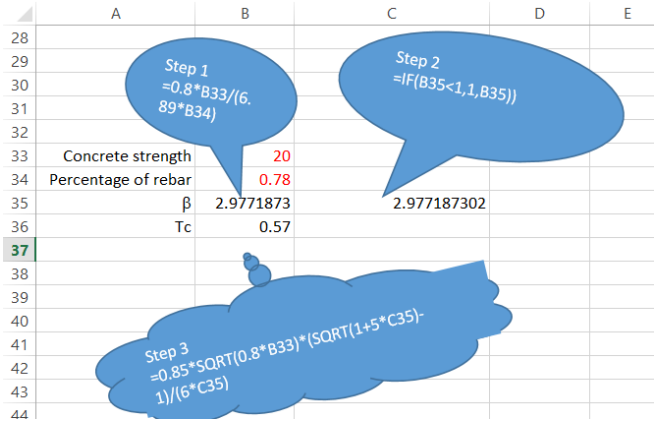
Use of formula in spreadsheet

- Take a example: find out shear strength of concrete τ_c based on percentage of reinforcement
- $\tau_c = \frac{.85}{6\beta}\sqrt{(0.80\sigma ck)}(\sqrt{1+5\beta}-1)$
- $\beta = \frac{.8\sigma ck}{6.89pt}$ >1
- If Pt = 0.78, And Concrete is M20,
- then β = 2.977 > 1, then β=2.977
- τ_c = 0.57

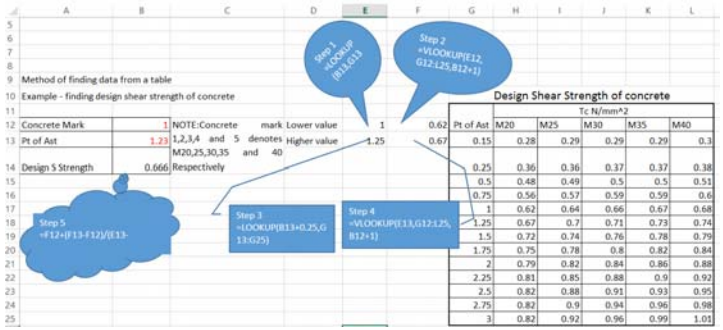
Use of spread sheet with formula



Use of table to find the Design shear strength

Design Shear Strength of concrete					
	Tc N/mm^2				
Pt of Ast	M20	M25	M30	M35	M40
0.15	0.28	0.29	0.29	0.29	0.3
0.25	0.36	0.36	0.37	0.37	0.38
0.5	0.48	0.49	0.5	0.5	0.51
0.75	0.56	0.57	0.59	0.59	0.6
1	0.62	0.64	0.66	0.67	0.68
1.25	0.67	0.7	0.71	0.73	0.74
1.5	0.72	0.74	0.76	0.78	0.79
1.75	0.75	0.78	0.8	0.82	0.84
2	0.79	0.82	0.84	0.86	0.88
2.25	0.81	0.85	0.88	0.9	0.92
2.5	0.82	0.88	0.91	0.93	0.95
2.75	0.82	0.9	0.94	0.96	0.98
3	0.82	0.92	0.96	0.99	1.01

Prototype commands to read any 3 dimensional table



Popular formula for calculation of Rebar area in singly reinforcement element

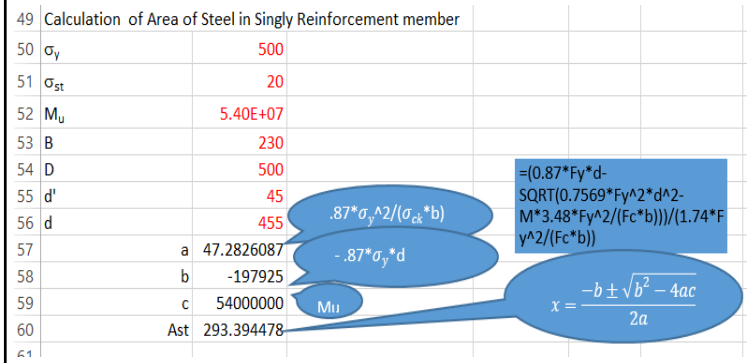
$$M_u = .87\sigma_y A_t\left(d - \frac{\sigma_y A_t}{\sigma_{ck} b}\right)$$

Mu: Moment of Resistance
The equation forms a quadratic equation, solving which gives area of steer in singly reinforcement flexural element

$$M_u = .87\sigma_y A_t\left(d - \frac{\sigma_y A_t}{\sigma_{ck} b}\right)$$

- Or .87*σ_y^2/(σ_{ck}*b)A_t^2 - .87*σ_y*d*A_t + M_u=0
- or ax^2-bx+c =0
- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Spreadsheet for Steel Area Calculation



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