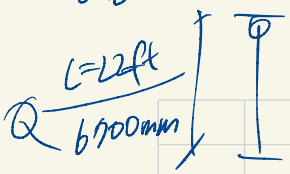
6.10.3



1) A572 Gr 60
2) D 100 kips
L 200 kips
3) W10×49 적정?
4) LRFD

(Unit : N-mm)
강재탄성계수 $E = 2.1\times10^5\ N/mm^2$

W10×49
- $A = 92.9\ cm^2$
- $I_y = 3880\ cm^4$
- $r_y = 6.46\ cm$

A ① $1.2D + 1.6L \doteq 2\times10^6\ N$

② $0.9\times F_y\times A \geq 2\times10^6 N$?
$3.5\times10^6 \Rightarrow$ ok

③ 세장비
$\frac{KL}{r}$ $\quad 4.71\sqrt{\frac{E}{F_y}}$

$\frac{0.8\times6700}{64.6}$ $\quad 4.71\sqrt{\frac{2.1\times10^5}{415}}$

$83 \leq 103$ ∴ 비탄성좌굴 가능.

④ $F_{cr} = \left[0.658^{\frac{F_y}{F_e}}\right]\times F_y$

$F_e = \frac{\pi^2E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2E}{\lambda^2} = \frac{2.1\times10^5}{83^2} \doteq 305$

$F_{cr} = 0.658^{\frac{415}{305}}\times 415 = 235$

$0.9\times F_{cr}\times A \geq 2\times10^6$?

$1.964.385 \geq 2\times10^6$? $\Rightarrow$ NG

W10×49

Use W10×~~55~~ 54

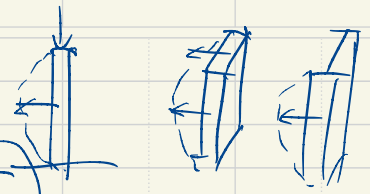
<주요개념>

- 압축재 : 기둥

RC
- 단주 : 세장비↓, 압축응력
- 장주 : 세장비↑, 좌굴↑

1) 세장비 $(\lambda) = \frac{KL}{r}$

2) 좌굴



Steel
- a) 비탄성좌굴 기둥 $\lambda \le 4.71\sqrt{\frac{E}{F_y}}$ 한계세장비
- b) 탄성좌굴 기둥 $\lambda > 4.71\sqrt{\frac{E}{F_y}}$

F_y: 항복강도
E: 탄성계수

- 오일러 탄성좌굴 이론 → F_y 관계X

$P_{cr} = \frac{\pi^2 EI}{(KL)^2}$ (N) 좌굴하중 $\rightarrow I = Ar^2$

$f_{cr} = \frac{\pi^2 E}{(\frac{KL}{r})^2} = \frac{\pi^2 E}{\lambda^2}$ (N/mm²)

- LRFD (vs ASD)

LRFD	ASD
하중계수(Factor)	하중 그대로
$0.9 \times P_n$	$P_n / 1.67$

$0.9 \times P_n \ge P_u$

계수하중
- 1.4D
- 1.2D + 1.6L
- ⋮

비탄성좌굴

a) $f_{cr} = \left[0.658^{\frac{F_y}{F_e}}\right] \cdot F_y$

b) 탄성좌굴

$f_{cr} = 0.877 F_e$

F_e