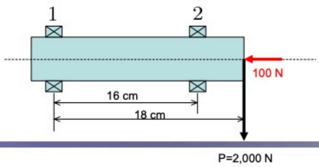
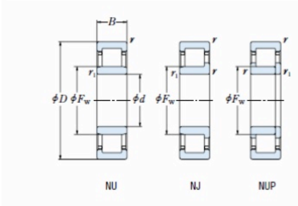
Ex 2) Bearing Selection (comb. load)

- **Assume an additional 100 N axial load. Bearing 2 is NU1010. Compute the f_s and L_{10} for 6810 (bearing 1)**





Dynamic Equivalent Load

$P = XF_r + YF_a$

$\frac{f_0 F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19	1	0	0.56	2.30
0.345	0.22	1	0	0.56	1.99
0.689	0.26	1	0	0.56	1.71
1.03	0.28	1	0	0.56	1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34	1	0	0.56	1.31
3.45	0.38	1	0	0.56	1.15
5.17	0.42	1	0	0.56	1.04
6.89	0.44	1	0	0.56	1.00

Static Equivalent Load

$\frac{F_a}{F_r} > 0.8,\ P_0 = 0.6F_r + 0.5F_a$

$\frac{F_a}{F_r} \leqq 0.8,\ P_0 = F_r$

- Bearing 2 is cylindrical roller (NU1010) with flat inner ring, thus no axial load can be supported.

$$\frac{F_a}{F_r} = \frac{100}{250} = 0.4 \leq 0.8 \Rightarrow P_o = F_r \quad \therefore f_s \text{ remains the same}$$

$$f_o = 17.2,\ C_o = 6200\ N \Rightarrow \frac{f_o F_a}{C_o} = \frac{17.2 \times 100}{6200} = 0.2744$$

Round up to 0.345 $\Rightarrow$ $e = 0.22$

$$\frac{F_a}{F_r} = 0.4 > e \Rightarrow X = 0.56,\ Y = 1.99$$

Thus, $P = XF_r + YF_a = 0.56 \times 250 + 1.99 \times 100 = 339\ N$

$$L_{10} = \left(\frac{C}{P}\right)^3 = \left(\frac{6400}{339}\right)^3 = \boxed{6729 \text{ million rev's}}$$

If we chose 6210 for bearing 2, then we can have bearing 2 support the axial load.

If we follow the same procedure, we have $P = F_r$ ($X = 1$, $Y = 0$)

↳ no need to consider axial load.

$$\Rightarrow L_{10} = \left(\frac{C}{P}\right)^3 = \left(\frac{35000}{2250}\right)^3 = 3764 \text{ million revs}$$