CYLINDERS CONNECTED IN PARALLEL WITH DIFFERENT AREAS

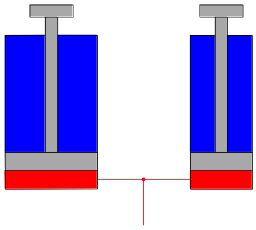
Which cylinder will extend first, as the pump flow rate is divided at the "T" connection?
By studying the calculations below, it will be seen, the larger diameter cylinder will extend first. first?

Assume there is a 5ton load on each cylinder

$$Force(N) = Tons \times 1000 \times 9{,}81$$

$$= 5 \times 1000 \times 9{,}81$$

$$\underline{\boldsymbol{= 49050\ Newton}}$$



The left-hand cylinder = 200 mm diameter. The right-hand cylinder = 100 mm diameter.

$$Area = \frac{3{,}142 \times 200^2}{4}$$

$$\underline{\boldsymbol{= 31420\ mm^2}}$$

$$Area = \frac{\pi \times D^2}{4}$$

$$\boldsymbol{\frac{31420}{7855} = 4}$$

$$Area = \frac{3{,}142 \times 100^2}{4}$$

$$\underline{\boldsymbol{= 7855 mm^2}}$$

The area of the 200 mm diameter cylinder is 4 times larger than the area of the 100mm diameter cylinder

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$$Pressure(MPa) = \frac{Force(N)}{Area(mm^2)}$$

$$Pressure = \frac{49050}{31420}$$

$$\underline{\boldsymbol{= 1,561 MPa}}$$

$$\boldsymbol{\frac{6,244}{1,561} = 4}$$

$$Pressure = \frac{49050}{7855}$$

$$\underline{\boldsymbol{= 6,244 MPa}}$$

The load on the 200 mm dia. cylinder causes 4 times less pressure than the load on the 100mm dia. cylinder.

Assume a pump of 50 litres/minute

Determine the Velocity (Speed) of each cylinder using a 50 litre per minute pump.

$$V(mm\ per\ min.) = \frac{Q(litres\ per\ \min. \times 10^6)}{Area(\ mm^2)}$$

$$10^6 = 1000\ 000\ cubic\ millimeters\ in\ a\ litre$$

$$Velocity = \frac{50 \times 10^6}{31420}$$

$$\underline{\boldsymbol{= 1591,343\ mm\ per\ min.}}$$

$$\boldsymbol{\frac{6363,372}{1591,343} = 4}$$

$$Velovity = \frac{50 \times 10^6}{7855}$$

$$\underline{\boldsymbol{= 6365,372\ mm\ per\ min.}}$$

The 200 mm diameter cylinder is 4 times slower than the 100 mm diameter cylinder