2.5 Tandem Cylinder

- Tandem cylinder is essentially a combination of two cylinders in tandem such that force derived from the first cylinder, supplements the force obtained by the second cylinder. More or less the force produced by a tandem cylinder is as twice as that of a conventional double acting cylinder of the same diameter.
- This type of cylinder is used where more force is to be generated and there is no scope for increasing the diameter of cylinder due constraint of space.

![Figure 2.5 Tandem Cylinder](image)

2.6 Rod less Cylinders

Different operational principals are used for the construction of Rod less cylinders:

1. Cable Cylinder
2. Sealing band Cylinder with slotted cylinder barrel
3. Cylinder with Magnetically Coupled Slide

Rod less cylinder have the following advantages:

- Available in long lengths –up to 4 m or even higher (as there is no buckling)
- Most ideally suited for stopping and fixing (Robotic application)
- Occupies less space as the extension of piston rod is not present

2.6.1 Rod less Cylinder with Magnetic Coupling

This cylinder has a hermetically sealed arrangement where piston is housed inside a sealed cylinder barrel. The piston is provided with number of annular ring magnets, radially polarised. An external sleeve which slides over the cylinder, is also provided with similar arrangement of ring magnets. Thus a magnetic coupling is established between the piston and slider. As the piston reciprocates due to supply of compressed air, the slider also reciprocates over the cylinder.
2.6.2 Rod less Cylinder- Mechanically Coupled

The cylinder barrel is provided with a slot across the entire length. The force is transmitted through a slide permanently connected to the piston. The connection from piston to slide is directed outwards through the slotted cylinder barrel. The slot is sealed by means of a sealing band, which seals the inside of the slot. The sealing band is guided between the piston seals and passed under the slide. A second metallic cover strip, covers the slot from the outside to prevent the ingress of dirt.