

LECTURE 12 TO 14

HYDRAULIC ACTUATORS

FREQUENTLY ASKED QUESTIONS

1. What is the function of a hydraulic cylinder in a hydraulic system

Function of hydraulic cylinder is to provide linear motion. It converts the fluid energy into mechanical energy (linear movement).

2. When is a telescoping cylinder used?

A telescoping cylinder is a cylinder employing several pistons which telescope into each other. This cylinder is used when a relatively long working stroke is needed for a short cylinder length. Telescopic configuration cylinders are used in a variety of applications that require the use of a long cylinder in a space-constrained environment.

3. Explain the operation of Tandem type cylinder and mention its application

Tandem Cylinders

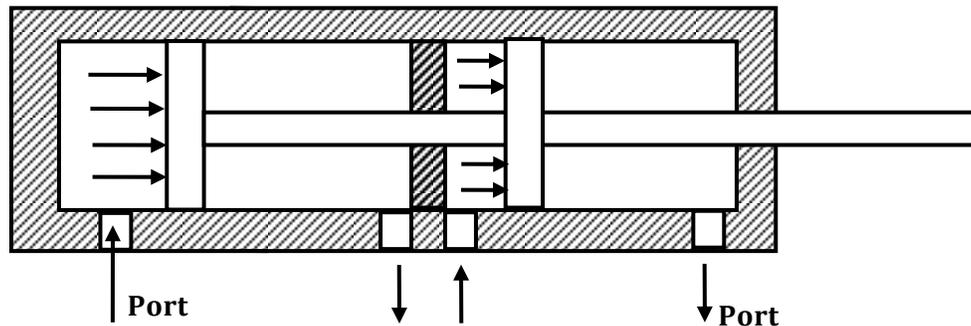


Figure 8.8: Tandem Cylinder

A tandem cylinder is used in applications where a large amount of force is required from a small-diameter cylinder. Pressure is applied to both pistons, resulting in increased force because of the larger area. The drawback is that these cylinders must be longer than a standard cylinder of

larger flow rate than a standard cylinder to achieve an equal speed because flow must go to both pistons.

4. Explain the function of cushioning in cylinders

Due to inertial forces of the moving parts at the end of piston travel, the piston will hit the cylinder head at full speed, To overcome this , the designers provide an arrangement by which hydraulic cylinder can be slowly retarded or cushioned during the last portion of the cylinder stroke.

5. Why are wiper rings used on cylinder rods ?

Wiper rings are used to prevent foreign abrasive or corrosive particles from entering a cylinder. These particles cause scratches and thus the leakage. Their purpose is not seal against pressure.

6. Mention two applications of single acting cylinders.

- Single acting cylinder are extensively used in jigs and fixtures, for clamping a work piece
- Used in transfer lines to eject a heavy component like knuckle of automobile

7. How does a welded type of cylinder differ from tie rod type?. Mention the major parts of tie rod cylinder

A tie-rod cylinder is a hydraulic cylinder that uses one or more tie-rods to provide additional stability. Tie-rods are typically installed on the outside diameter of the cylinder housing. In many applications, the cylinder tie-rod bears the majority of the applied load. A welded cylinder is a smooth hydraulic cylinder that uses a heavy-duty welded cylinder housing to provide stability.

8. What are the technical specification of a hydraulic cylinder ?,

Important operating specifications for hydraulic cylinders include the cylinder type, stroke, maximum operating pressure, bore diameter, and rod diameter. Choices for cylinder type include tie-rod, welded, and ram. Stroke is the distance that the piston travels through the cylinder. Hydraulic cylinders can have a variety of stroke lengths, from fractions of an inch to

many feet. The maximum operating pressure is the maximum working pressure the cylinder can sustain. The bore diameter refers to the diameter at the cylinder bore. The rod diameter refers to the diameter of the rod or piston used in the cylinder.

9. Name the material that are commonly used to manufacture i) cylinder covers ii) Piston rods iii) pistons iv) Tie rods

Cylinder	High Precision Seamless Steel tube, ST42, ST44, ST52 16Mn 27SiMn 25Mn St52 SAE1026, plasma nitrited
Piston rod	Forged steels, C45 ground- hardened and hard chrome plated.
Tie rods (inside)	4140HT steels, 1045 steel with heat treatment subsequent to thread rolling to give sufficient strength

10. What is hydraulic ram

A hydraulic ram is a device in which the cross-sectional area of the piston rod is more than one-half the cross-sectional area of the moving component. Hydraulic rams are primarily used to push rather than pull, and are most commonly used in high pressure applications.

11. Mention the different types of mountings used in fixing the hydraulic cylinders

Pivoted center line mounts	Fixed centerline mounts	Fixed non-centerline mounts
<ul style="list-style-type: none"> - Rod end trunnion - Blind end trunnion - Clevis mounted - Center truunion 	<ul style="list-style-type: none"> - Tie rod - Rod end flange - Blind end flange - Centre line lugs 	<ul style="list-style-type: none"> - End lug mounts - Side lug mounts - Integral key mounts - Flush mounts