Hydraulic cylinders for harvesters

Hydraulic Cylinders for Harvesters serve as the core actuators in agricultural machinery hydraulic systems. Their function is to convert hydraulic energy into mechanical energy, driving critical operations such as cutting disc elevation, angle adjustment, and grain tank tilting. Their performance directly impacts harvesting efficiency, operational precision, and equipment reliability.

First, Core Functions and Working Principles

1. Functional Implementation

Cutterbar Adjustment: Hydraulic cylinders raise/lower or angle the cutterbar to accommodate varying crop heights and terrain.

Grain Tank Tilting: Double-acting cylinders drive the grain tank's tilting mechanism for rapid unloading.

Straw Walker Control: Single-acting cylinders position the straw walker to optimize crop pickup.

Steering and Variable Speed: Certain models utilize hydraulic cylinders for steering or speed regulation.

2. Working Principle

Based on Pascal's principle, high-pressure hydraulic fluid enters one side of the cylinder through the inlet port, driving the piston and rod to move. Fluid on the opposite side is discharged through the outlet port. Reverse fluid flow causes the piston to move in the opposite direction, achieving linear reciprocating motion. For example:

Single-acting plunger cylinder: Fluid enters only one side; return relies on gravity (e.g., header cylinder).

Double-acting piston cylinder: Oil ports on both sides enable bidirectional force application for precise pushing/pulling (e.g., grain silo tilting cylinder).

Second, Structural Classification and Characteristics

1. Classification by Operating Mode

Single-acting hydraulic cylinder:

Simple structure, low cost, suitable for unidirectional motion (e.g., header lifting).

Disadvantages: Requires external force for return, limited control flexibility.

Double-acting hydraulic cylinder:

Can exert force in both directions, enabling precise control and suitable for frequent directional changes (e.g., grain bin tilting, continuously variable transmission).

Complex structure, higher cost.

2. Classification by Mounting Method

Ear-ring type: Connects to mechanical structures via ear rings, suitable for space-constrained applications.

Flange type: Mounted via flange plates, offering high load-bearing capacity for heavy-duty scenarios.

Rod-Ear Type: Features ear rings on the cylinder rod for flexible installation and multi-angle operation.

Third, Application Scenarios and Case Studies

1. Corn Combine Harvester

Header Cylinder: Single-acting plunger type. Hydraulic fluid raises/lowers the header;

gravity facilitates return.

Hustler Wheel Cylinder: Adjusts hustler wheel height to optimize crop pickup.

2. Combine Harvester

Grain tank tilting cylinder: Double-acting piston cylinder enabling rapid grain tank emptying.

Steering cylinder: Drives the steering linkage for agile maneuvering.

3. Wheat Harvester

Cutterbar angle adjustment cylinder: Double-acting cylinder precisely controls cutterbar angle to adapt to varying crop densities.

Hydraulic cylinders for grain harvester

Hydraulic cylinders for combine harvesters