Troubleshooting Guide for Leaking Hydraulic Cylinders for Harvesters

As the core actuating element of the hydraulic system, the sealing performance of hydraulic cylinders is critical. This article will introduce you to the causes, manifestations and solutions of leakage failures occurring in <u>hydraulic cylinders for harvesters</u>, providing systematic guidance for farm equipment maintenance personnel.

1. Hydraulic cylinder leakage

(1) Causes of failure

① Seal failure mechanism

Material degradation: Nitrile rubber seals will accelerate the aging and elasticity decline under continuous high temperature.

Wear pattern: the reciprocating motion of the piston rod produces microscopic wear, sealing lip groove-like damage, the depth of more than 0.2mm that is the loss of sealing function.

2 piston assembly damage

Impact damage: sudden overload of the piston rod to withstand the impact of the rated load can be up to 3-5 times, resulting in bending and deformation of the rod.

③ cylinder failure mechanism

Abrasive wear: hydraulic oil pollution exceeds the standard, hard particles caused by the cylinder cylinder wall depth of scratches exceed the standard.

Corrosion damage: water-containing hydraulic oil triggers galvanic corrosion, pitting pits appear on the inner wall of the cylinder barrel.

(2) Impact

Loss of energy efficiency: internal leakage caused by the hydraulic pump output flow 15-20% is wasted, fuel consumption increases.

Control failure: the position control system error increases, affecting the precise adjustment of the cutting height of the harvester.

(3) Repair Program

Seal system upgrade

Adopt fluorine rubber seals to improve high temperature resistance.

Implement double-lip sealing structure to reduce leakage.

Piston rod reinforcement

Surface plated with ceramic layer to enhance hardness and wear resistance.

Adopt ultra-precision honing process with laser cladding technology to repair corroded areas.

Installation of magnetic filter to control oil cleanliness.

2. Failure analysis of external leakage of hydraulic cylinders

(1) Causes of failure

1)Rod damage

Scratch damage: straw and other foreign objects intrusion during harvesting operations, resulting in piston rod ring-shaped scratches.

Corrosion damage: saline operating environment to accelerate electrochemical corrosion, surface erosion holes.

(2) seal assembly defects

Installation error: the seal tilt angle is too large, resulting in uneven distribution of contact stress.

Improper selection: silicone rubber seals are used in low-temperature environments, and

low-temperature brittleness leads to seal failure.

(2) Impact

Lubrication failure: leading to inadequate lubrication of the hydraulic system, exacerbating wear.

Fire risk: oil leakage from the surface of high temperature parts, risk of spontaneous combustion.

(3) Repair program

Repair the etched holes using laser melting technology.

Implement surface chrome plating + polishing process.

Optimization of sealing system

Selection of combined seal (O-ring + retaining ring).

Connection parts improvement

<u>hydraulic cylinders for harvesters</u> leakage prevention and treatment needs to be "the right medicine", it is recommended that users of agricultural machinery to establish a complete maintenance file, combined with the manufacturer's guidance to develop a personalized maintenance plan to ensure that the hydraulic system continues to operate efficiently.

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