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Circumferential Groove in Cylinder of Piston Machines

Novel hydrostatic balancing technology prevents metal-to-metal contact in swash-plate axial-piston machines, enabling high-pressure operation with low-viscosity fluids like water.

In current swash-plate type axial-piston machines, the pistons move axially in a dynamically changing tilted position, traveling periodically between the inner and outer dead center of the piston while the unit's machine shaft rotates. The fluid film between the piston and its surrounding cylinder bore or bushing is on the order of microns thick, and currently, inefficiencies exist in these machines due to metal-to-metal contact in pistons that result from insufficient fluid film.

Researchers at Purdue University have developed a novel approach to prevent metal-to-metal contact in pistons in the event of insufficient hydrodynamic load carrying ability of the fluid film between the piston and cylinder through the utilization of hydrostatically balanced areas. Subsequently, this technology equips the design of swash-plate type machines for high pressure, utilizing low-viscosity fluids, like water. The technology helps increase the load-carrying capacity of the fluid film between the piston and cylinder due to additional hydrostatic bearing capacity, which helps prevent metal-to-metal contact.

Advantages:

-Prevents metal-to-metal contact between the piston and cylinder

-Allows swash plate type machines to utilize low viscosity fluids like water

Potential Applications:

-Piston-cylinder bores

-Axial piston pumps

Technology ID

2015-IVAN-67231

Category

Robotics & Automation/Simulation, Digital Twins, & Industrial Automation

Energy & Power Systems/Power Generation

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View online

TRL: 2

Intellectual Property:

Provisional-Patent, 2015-07-13, United States | Utility Patent, 2016-07-12, United States

Keywords: swash-plate type axial-piston machines, piston-cylinder, metal-to-metal contact prevention, hydrostatic bearing capacity, hydrodynamic load carrying ability, low-viscosity fluids, axial piston pumps, high pressure machinery, fluid film technology, hydrostatically balanced areas

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