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Pressure Adaptive Piston Pump Design

A new piston/cylinder interface design for axial piston machines utilizes a circumferential groove to reduce leakage and friction, increasing energy efficiency and lowering manufacturing costs by lessening tolerance requirements.

Swashplate-type axial piston machines are a favorite in fluid power applications because of their ability to operate at high pressure and their versatile control. The piston/cylinder interface of an axial piston machine contributes significantly to the machine's net energy dissipation due to leakages and viscous friction. Current solutions typically require micron-level machining which increases manufacturing costs.

Researchers at Purdue University have developed a new design for the piston/cylinder interface with a circumferential groove which reduces leakage, improving the interface's sealing function without requiring advanced manufacturing techniques. From simulation, they have demonstrated that this design is able to achieve net energy dissipation at nominal clearance levels that is equivalent to the baseline unit operating at a 15 percent reduced clearance. These lessened tolerance requirements will reduce manufacturing costs. In addition, costs will be reduced by the simplicity and macro-scale of the grooved design compared with other techniques such as micro-surface shaping. This technology can be implemented into any existing swashplate-type axial piston machine via an inserted bushing.

Advantages:

-Cost efficient

-Increased energy efficiency

-No need for advanced manufacturing techniques

Potential Applications:

-Manufacturing

Technology ID

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Category

Automotive & Mobility Tech/Internal Combustion Engine Optimization

Robotics & Automation/Automation & Control

Authors

Shanmukh Sarode

Lizhi Shang

Andrea Vacca

Further information

Parag Vasekar

psvasekar@prf.org

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