



Variable Displacement External Gear Machine

A simple, low-cost, and easily manufacturable design allows external gear machines to achieve partial variable displacement for energy-efficient hydraulic systems.

External gear machines (EGMs) are one of the most widely used hydraulic components in fluid power applications. The strong-point of these machines lies in their reliability, operating efficiency, compact size and low cost. Such machines are used in many engineering functions such as construction and agricultural machines, naval and aerospace applications, and industrial presses and forming machines. In certain applications, though, EGMs can operate with high waste of energy due to their fixed displacement restraint. Because of that, EGMs cannot be used as main hydrostatic units in modern energy efficient layout configurations based on variable flow supplies, such as in load sensing systems, hydrostatic transmissions or displacement controlled systems.

Researchers at Purdue University have developed a simple, low cost design for an efficient, variable displacement EGM. This design comes with all of the normal benefits of an EGM, but also allows for variable displacement (VD). Current methods to apply variable displacement to EGMs involve such costly and tedious alterations to the machines that they are rarely used in most applications. This design, though, only involves the addition of one movable member to the bearing block, which acts on the meshing of the gears, specifically determining the optimal timing of the connections between the tooth space volume and delivery. By also including asymmetric gear teeth, this design can achieve a large displacement variation range. The design is an efficient, low cost alternative to current, expensive VD designs for applications which require only partial displacement variation.

Advantages:

- Low cost and simple, compact design
- Allows for partial variable displacement

Technology ID

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Category

Energy & Power Systems/Power
Generation
Robotics &
Automation/Automation &
Control

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-Easily manufacturable

Potential Applications:

-Hydraulic systems

-External gear machines

TRL: 6

Intellectual Property:

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| NATL-Patent, 2016-08-25, United States

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