

Spherical Golubev Machine

The SGM is an innovative reciprocating device that includes no parts with reciprocating motion. It produces no vibration, changing accelerations, or non-uniform loads.

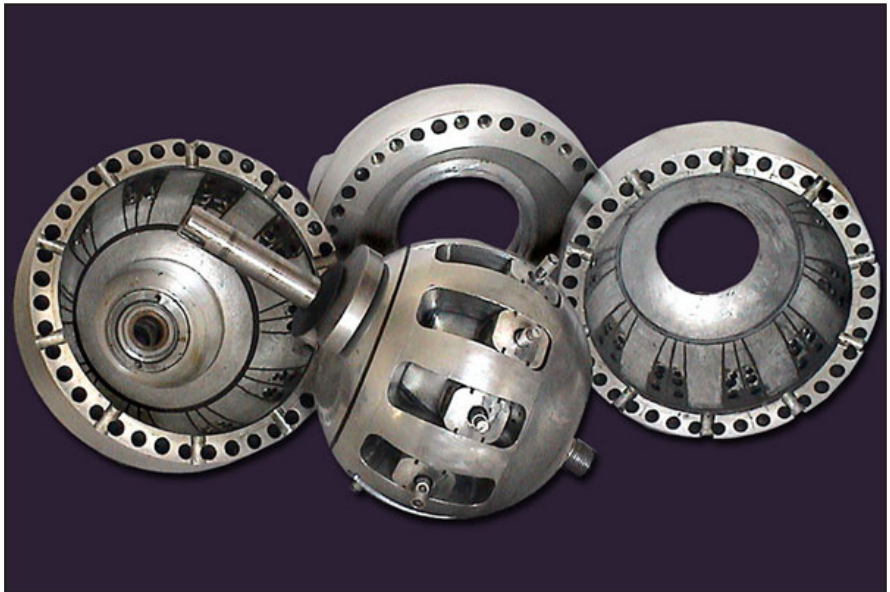
The Spherical Golubev Machine (SGM) is a revolutionary technology for the design and production of positive-displacement machines such as compressors, expanders, pumps, motors, engines and the like. SGM is the latest generation in the evolution from 2D to 3D reciprocating kinematics, which provides the user with very compact machines, high operational speeds up to 30,000 rpm, valveless gas distribution, low friction, and higher overall efficiency and performance. The motion of the SGM is truly unlike anything else.

SGM technology offers significantly smaller machine size and volume than any reciprocating machines with the same displacement. SGM can operate at higher speeds due to low friction and full system balance, at the same time being oil-free. This allows SGM devices to be applied in the fields between conventional reciprocating devices and rotary systems.

SGM is a positive displacement, reciprocating device, but at the same time there are no parts with reciprocating motion. This design produces no vibration, changing accelerations, or non-uniform loads. All parts of the system move at constant speeds. The SGM is a fully balanced device by the nature of its design. There are no special counterweights or balancing parts, systems and the like. This allows implementation of machines with high rotation speeds (up to 30,000 rpm).

Zero side-force, smooth rotation

The compact design of the SGM provides a device that is 3–5 times smaller in size than any reciprocating machine with the same displacement. Its displacement is approximately equal to the cube of its radius.



Typically, SGM machines have a large number of cylinders (from 12 to 36), which means smooth rotation, torque, and flows. There are no peak loads on the parts. SGM produces no axial thrust; there is no need for thrust bearings on the main shaft, an advantage for hydraulic and other high-energy-density applications.

SGM has a significantly smaller part count than conventional positive-displacement devices; most of the parts are identical (a small machine can have as few as 12–15 different parts). The pistons exert zero side-force on the cylinder walls, which translates into longer life and oil-free operation in applications such as pumps. There is no need for cylinder sleeves or specific materials/coatings.

Variable displacement can be achieved by changing the piston stroke and/or by switching some of the cylinders off or on. SGM has no valves. The distribution of the working medium is done by the natural movement of specific parts. Even a four-stroke SGM engine can operate without valves.

SGM offers a high degree of integration — a two- or three-stage machine can be built in the same size as a one-stage SGM. It is easy-to-integrate with drives (electric, engine, hydraulic, etc.).

Applications include compressors and expanders, hydraulic pumps, IC engines — especially for automotive hybrid installations or general aviation — co-generation systems, and similar applications that call for a small, powerful, and simple device.

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