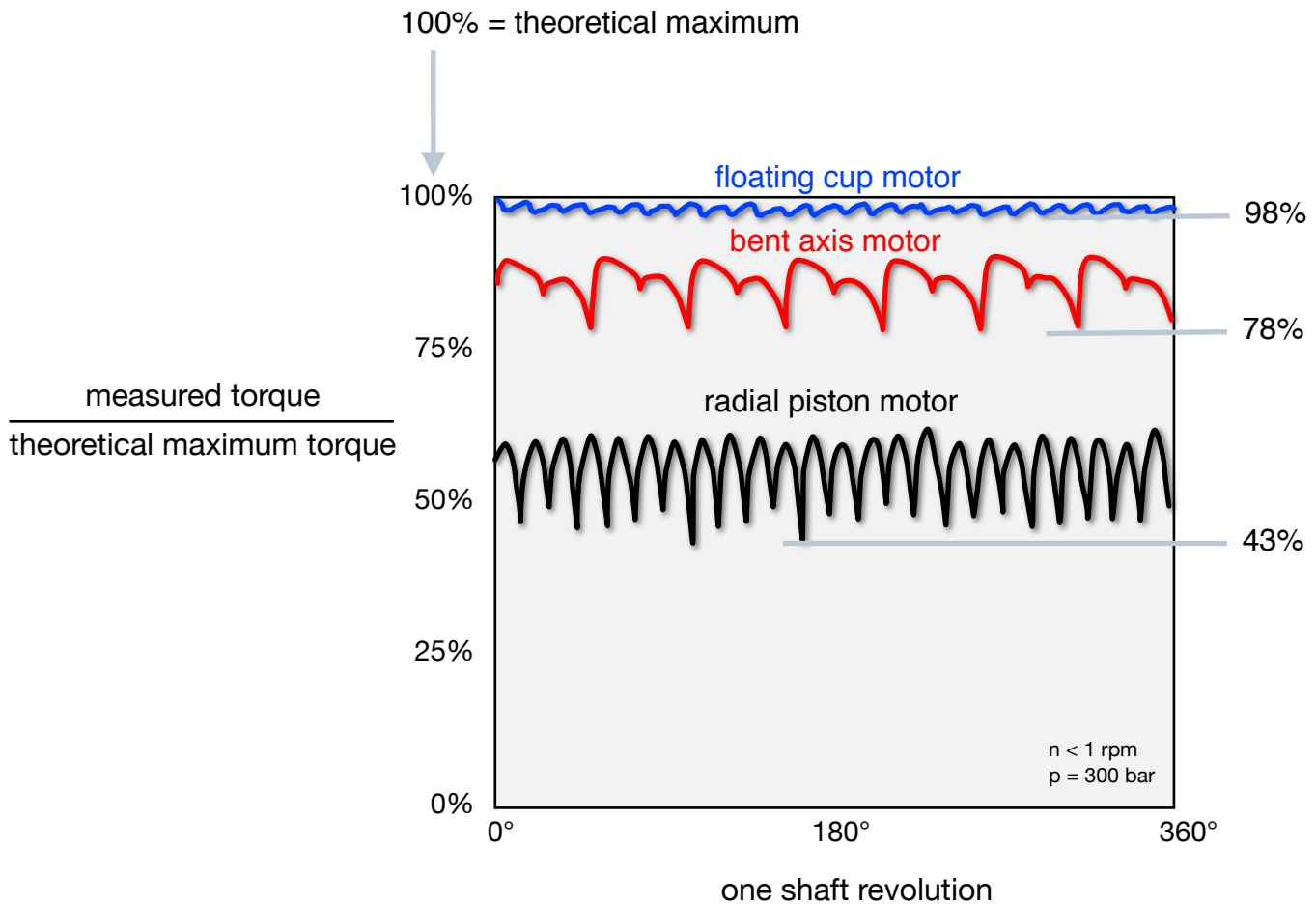


THE STRONG FLOATING CUP



The diagram shows a comparison of measured torque efficiencies for different hydrostatic principles at extremely low rotational speeds ($< 1 \text{ rpm}$). The torque of a floating cup motor is almost equal to the theoretical maximum. The test results also show a very small torque ripple for floating cup motors. This is one of the advantages of the high number of

pistons. Compared to the bent axis motor, the floating cup motor delivers about 20% more torque at start-up and breakaway. Compared to the radial piston motor, the torque efficiency is even twice as high. The elimination of stick-slip and the smooth output torque improves the controllability at low operating speeds and breakaway.

STRONG AND SMOOTH

THE IMPORTANCE OF LOW FRICTION

Current hydraulic pumps and motors have a strong non-linear behavior at low operating speeds. Many have a minimum speed requirement of 100 rpm or higher. The stick-slip behavior deteriorates the dynamic control, and thus the productivity of hydrostatic driven machines. Due to the reduced torque at start-up, the motor size needs to be increased to compensate for the friction losses and torque variation.

FLOATING CUP

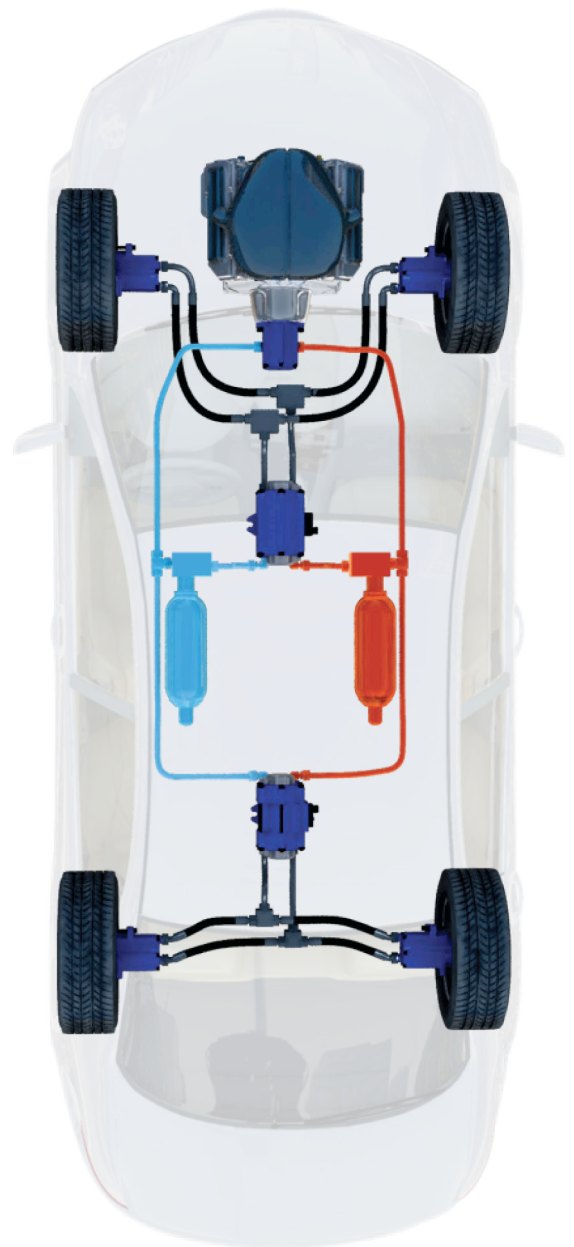
The floating cup principle eliminates these disadvantages. There is no minimum operating speed, no stick-slip behavior and hardly any torque loss at breakaway. Floating cup machines greatly improve hydraulic winches and other applications where dynamic load control is needed.

NOISE, VIBRATION AND HARSHNESS (NVH)

The high number of pistons of the floating cup principle results in an extremely smooth torque output. This opens new markets for the hydraulic industry, especially for those applications where NVH is of importance. An example are the recent developments of hydraulic hybrid transmissions for passenger cars and other vehicles.

FLOATING CUP EFFICIENCY

Hydrostatic pumps and motors are positive displacement machines. Sliding interfaces, like between pistons and cylinders, can not be avoided in these machines. But it is possible to avoid high loads in these interfaces, and thus friction and wear. This is what is realized in the design of floating cup pumps and motors.



More information about Innas and the floating cup technology can be found at www.innas.com



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