

Test results Innas Floating Cup pump (February 2005)

This paper summarises the test results for the Innas Floating Cup pump up to February, 2005. The measurements have been performed by the "Institut für Fluid-technische Antriebe und Steuerungen" of the University of Aachen, Germany (IFAS) and the Technical University of Eindhoven (TUE).

The Floating Cup pump tested is a 28cc pump with 24 pistons. In order to compare the results, a bent-axis pump and a slipper type pump have been tested under the same conditions. Measurements conducted by IFAS and TUE were performed in accordance with ISO 4409.

Low Speed tests

IFAS performed low speed measurements of the 28cc Floating Cup pump running as a motor at very low speed (0.1 rpm using HLP46 oil at 40°C). The results are compared with a conventional bent-axis pump with the same displacement volume also running as a motor. Figure 1 presents the torque losses and the hydromechanical efficiency.

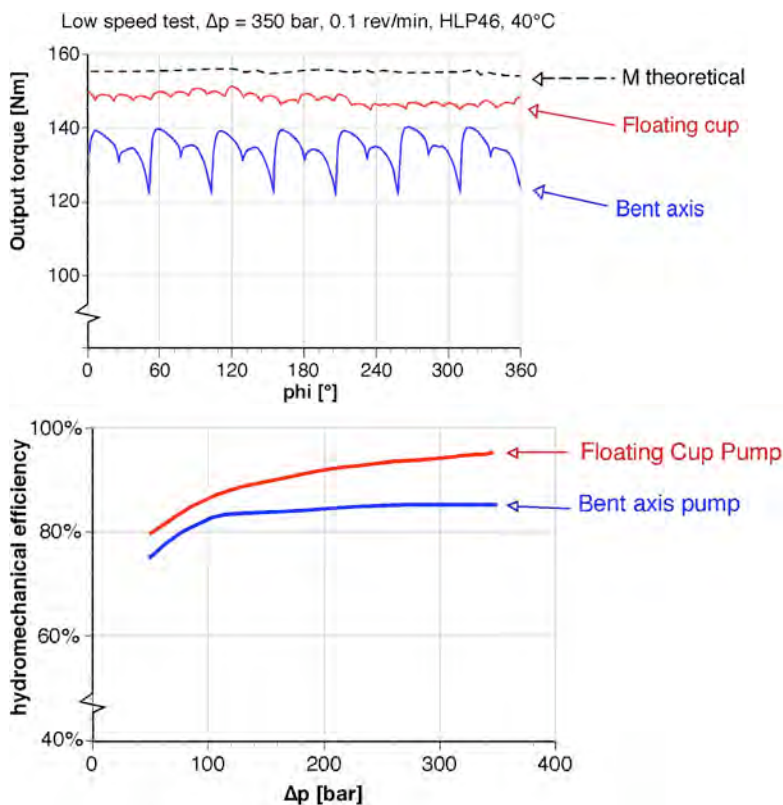


figure 1: Provided torque within one revolution and hydromechanical efficiency at different pressures (bar) of a Floating Cup pump compared to a bent axis pump, at very low speed (0.1rev/min). January 2004.

Pressure pulsations

IFAS has performed comparing measurements for pressure pulsations in the output line. Both a Floating Cup pump and a bent axis pump have been measured. Pressures ranging from 50 to 350 bar (50 bar intervals) are presented in figure 2 at speeds of 500 to 3000 rpm (500 rpm intervals).

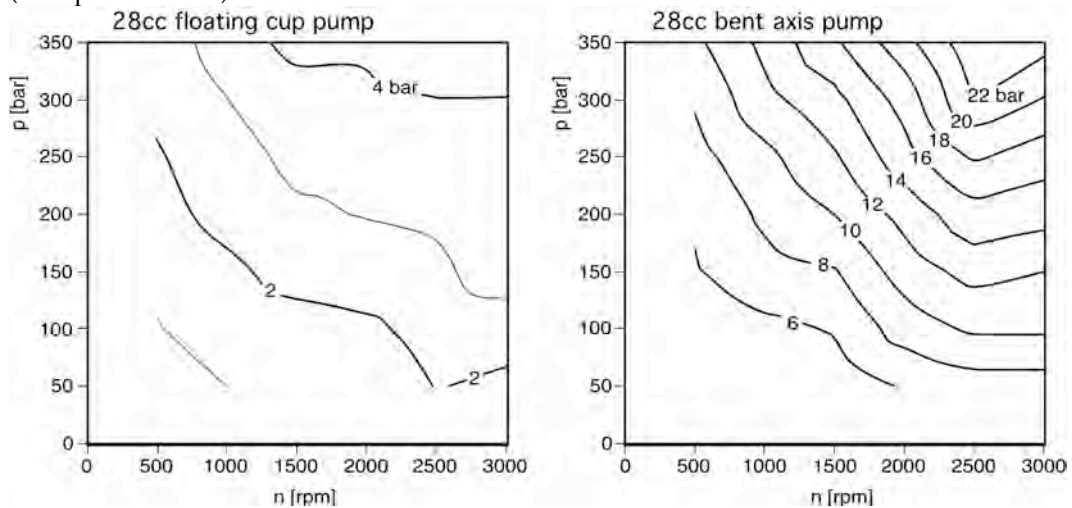


figure 2: Pressure pulsations (peek to peek value of the ripple) of the Floating Cup pump and a bent axis pump. On average the pressure pulsations of the Floating Cup pump are 80% lower. *January 2004.*

Figure 3 shows the individual pressure pulsations of the Floating Cup pump and the bent axis pump during one revolution. The graphic clearly shows a significant difference between the 24 piston Floating Cup machine and 7 piston bent axis machine.

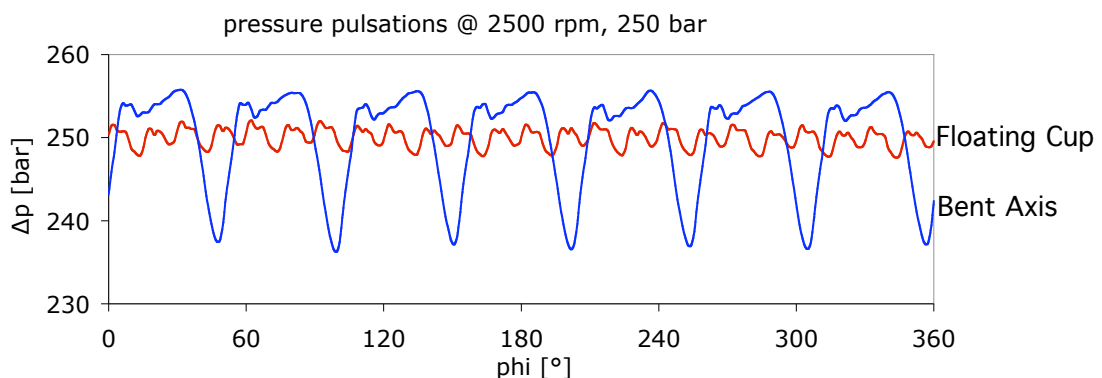


figure 3: Comparing pressure ripple of a 24 piston Floating Cup pump and a 7 piston bent axis unit at fixed conditions during one revolution. *January 2004.*

Overall Efficiency

Efficiency of the Floating Cup pump has been measured in a field of pressures ranging from 50 to 350 bar (50 bar intervals) and speeds from 500 to 3000 rpm (500 rpm intervals). In figure 4, hydraulic and hydromechanical efficiencies are combined into the overall efficiency. Measurements have been compared to a bent axis, as well as a slipper type pump. Measurements conducted by IFAS and TUE were performed in accordance with ISO 4409.

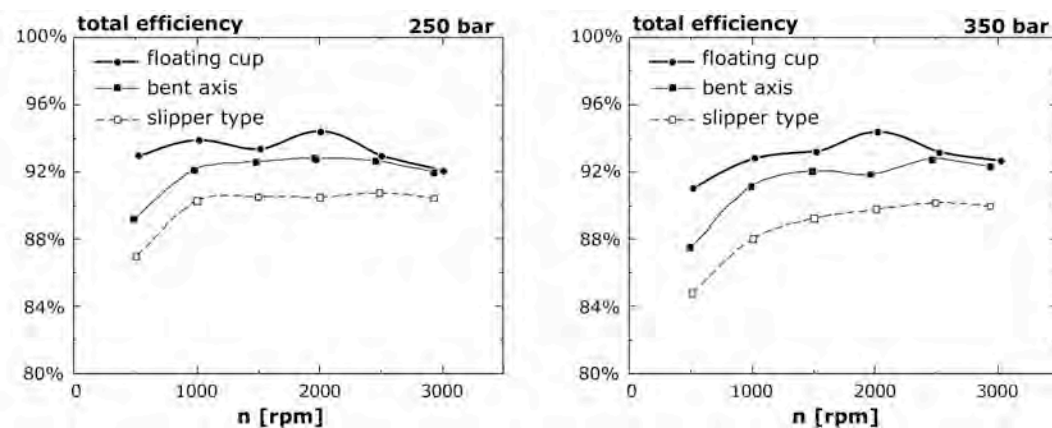


figure 4: Overall efficiency of the Innas Floating Cup pump, a bent axis and a slipper type pump at two different pressure levels. February 2005.