INNOMAG
Advanced Sealless Pumps

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Thrust Balancing

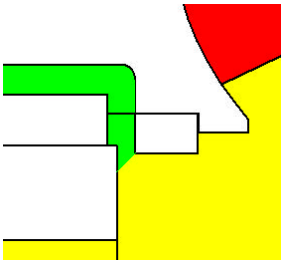

Figure 2 - Valve Opening at higher flows.

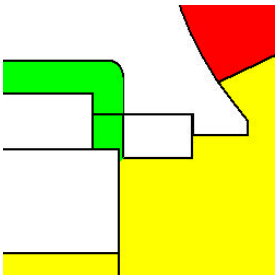

Figure 3 – Valve Closing at lower flows.

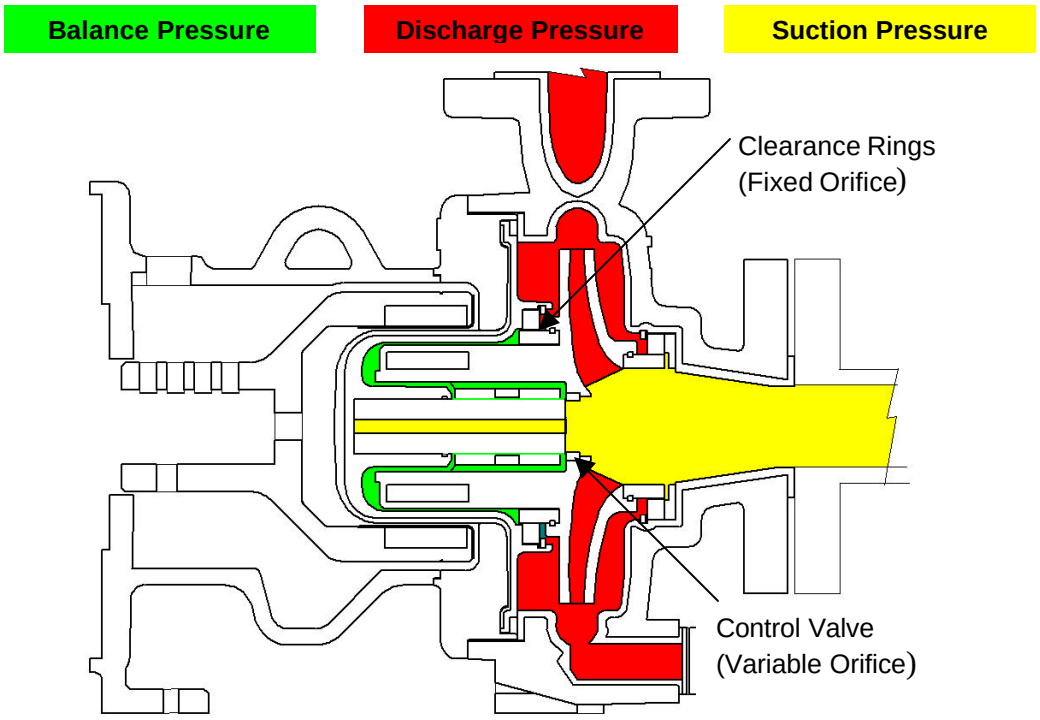

Figure 1 – Thrust Balancing Pressure Zones

The TB-mag pumps create three distinct pressure regions around the impeller. These regions are the **suction pressure** in the impeller eye, the **discharge pressure** in the volute and the **balance pressure** behind the impeller (Figure 1). In operation, the balance pressure is approximately one quarter to one third of the discharge pressure. The discharge pressure is created by the routine pumping action of the impeller while the balance pressure is controlled by the combined action of a fixed orifice and a variable orifice. The fixed orifice is created by a set of clearance rings behind the impeller. These rings limit the leakage flow behind the impeller to a relatively constant rate. The leakage then flows around the magnets, past the bushing to the thrust control valve. This thrust control valve combined with the front of the shaft defines the variable orifice. Because the impeller is free to slide axially the variable orifice changes size. As conditions of service change for the pump the impeller will automatically compensate for the pressure change and remain thrust balanced. If the impeller moves forward **(figure 2)**, the valve is opened to a greater degree and the balance chamber pressure is reduced. This causes the impeller to react with a net force towards the motor. However, the valve is now closing **(figure 3)** and the balance chamber pressure increasing. This moves the impeller towards the suction. The net result is a very stable axial position for the impeller. There are no axial bearings and the radial bearings always operate in a pressurized fluid environment. Compare axial thrust loads in **(Figure 4).**

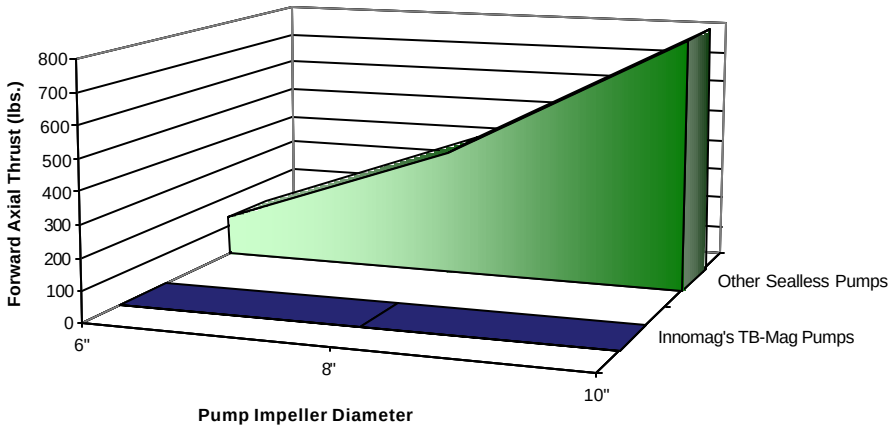

Figure 4 – Axial Thrust Loads