

SECTOR:
WATER

OFFERINGS:
ENGINEERING SIMULATION
SERVICES

TECHNOLOGY:
FLUID DYNAMICS

PERFORMANCE ESTIMATION OF NON-RETURN VALVE AND CONTROL VALVE

Our customer is a manufacturer of industrial valves required mainly for hydro-projects. The customer is engaged in construction and commissioning of an irrigation project. The project consists of high flow rate pumps along with the corresponding non slam check valves. The governing body for the irrigation project wishes to conduct CFD analysis to estimate the performance of the valves for approval of installation and chose Zeus Numerix for the analysis.

The non-return valve (NRV) is a multi-door valve with three flaps and those have been modeled separately. Unstructured mesh with prism layers near the walls has been made. Special care has been taken to have a higher mesh density near the pipe walls to capture the boundary layer. Same care has been taken for the butterfly valve (BV). Multiple meshes have been created for different flap opening angles. Pressure based CFD solver is used to solve the flow. The simulation estimated flow coefficient (C_v), hydraulic drag, resistance coefficient (K) and head losses. Regions of high or low pressure and recirculation zones were identified in the valve. The flow parameters are compared for various valve opening angles.

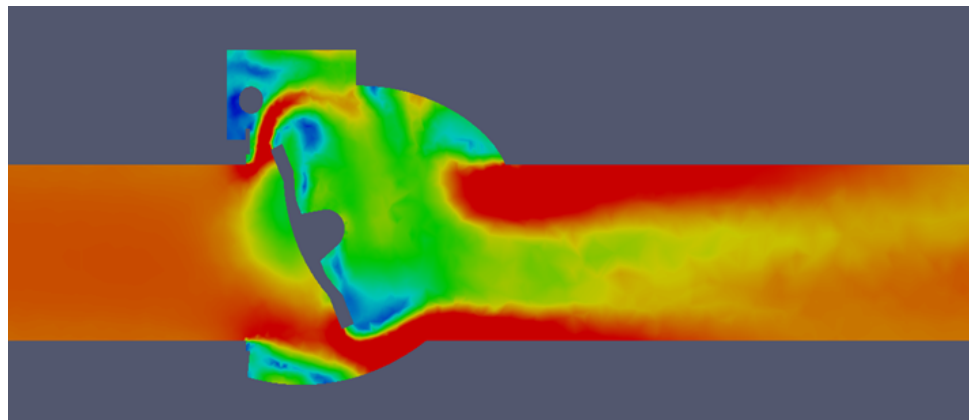


Figure 1: Velocity plot of flow across partially open valve

A consolidated analysis report consisting of performance parameters of both NRV and BV were provided to the customer. The report clearly gave graphs of C_v , K , and head loss vs. valve opening. Contour plots, iso-surfaces and streamline plot are provided for each case with clear markings for recirculation zones. Valve closing time is reported as graph of closing angle vs. time. The customer used our report to get clearance for installation of the valves.