SECTOR:
WATER

OFFERINGS:
ENGINEERING SIMULATION SERVICES

TECHNOLOGY:
FLUID DYNAMICS AND STRUCTURES

CFD & VIBRATIONAL ANALYSIS OF SPLIT CASE PUMP

Our customer is multinational firm involved in the design and manufacturing of variety of pumps. The customer has supplied centrifugal type split case pump to an irrigation site. Vibrations are measured on the bearing of housing pump and are not in acceptable range. The customer engaged Zeus Numerix to carry out CFD and FEA analysis to predict flow induced vibrations of the existing design and suggest design changes to alleviate the problem.

Zeus Numerix performed steady state CFD analysis of the existing double split case pump with focus on the modeling of impellers. Flow behaviors viz. swirl, cavitation, flow rate at both impeller eyes were estimated. The time varying hydraulic loads obtained from the CFD analysis were used for structural analysis. CFD analysis was done for three different impeller positions. Smaller patches of separation zones and stagnation zones are identified at exit of volute. Natural frequency of the existing design was estimated and root cause for vibrations of the pump are evaluated. Horizontal and vertical vibrations are estimated from structural analysis.

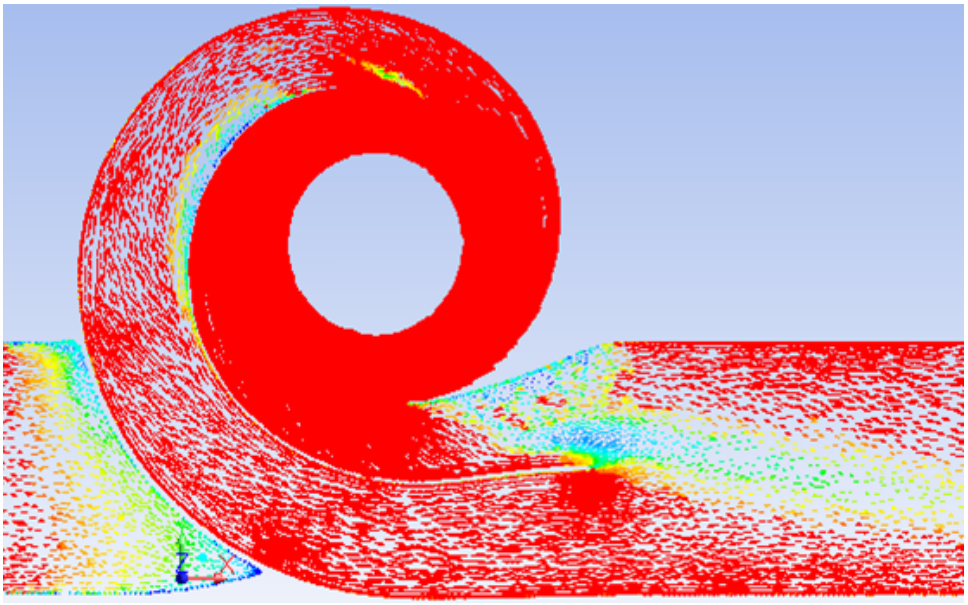

Figure 1: Velocity vector plot across the split case pump

Analysis report consisting of CFD and FEA results of the existing pump design is delivered to the customer. The design improvements based on CFD analysis to reduce flow induced vibration are suggested. Based on structural analysis, flanges and other parts that needed stiffening were indicated in the report. Customer used our report to improve the existing design and made changes in the installation setup.

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