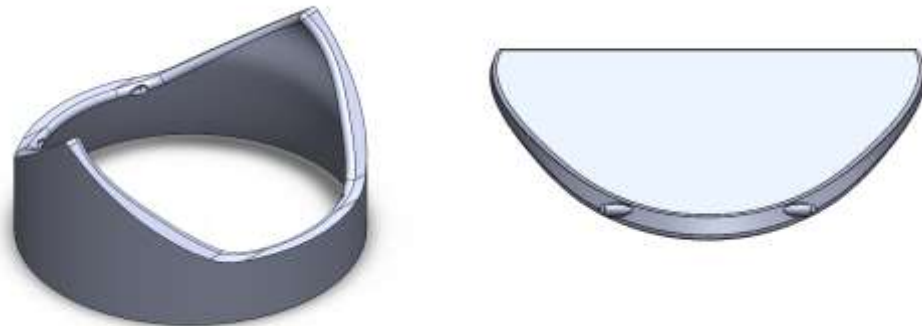


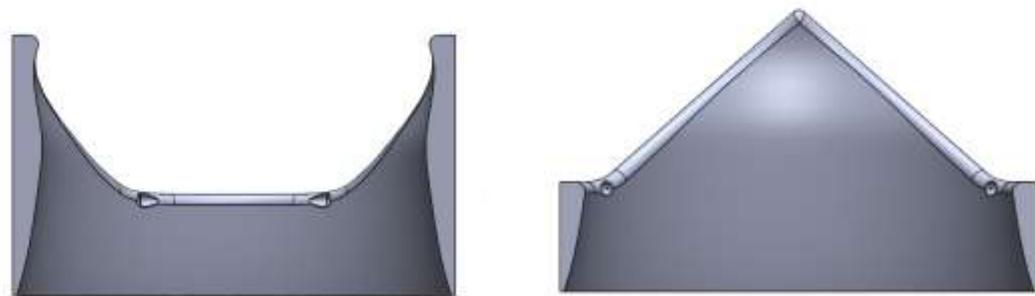
Combined Tilting Disc and Bileaflet Mechanical Valves Features a Possible Solution for Better Hemodynamic Performance

Nima Mirkhani, Mohammad Reza Davoudi, Pedram Hanafizadeh, Niloofar Saffarian, Daryoosh Javidi

Design:



Different components of the newly designed valve a) housing with two sets of recessed hinges in the lateral part b) leaflet with rounded edges which is aimed to prevent interference with cardiac structure



Two sections of housing structure a) housing inner profile at the section parallel to leaflets axis of rotation b) housing inner profile at the section perpendicular to leaflets axis of rotation

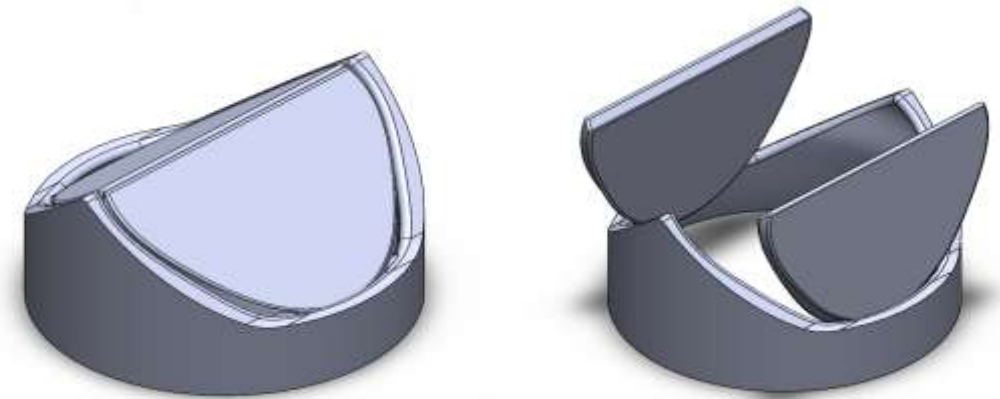
Aims:

- Provide Larger Single-jet Structure Similar to Native Valve
- Retrieve Recirculation Zones in Sinus Area Which Facilitate the Valve Closure Process
- Reducing High Shear Stresses Associated with High Velocity Gradients

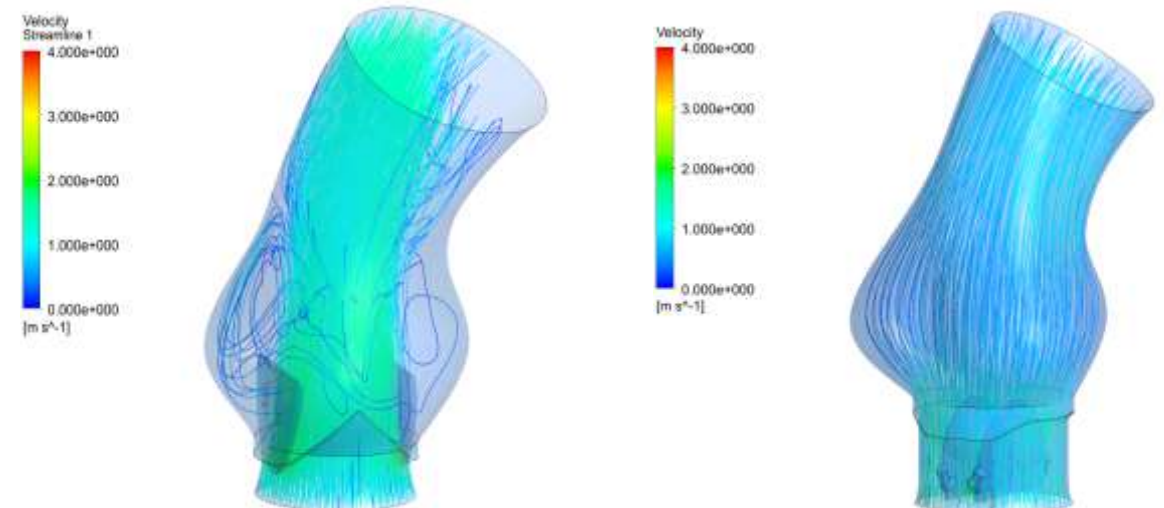
Methods and assumptions:

- Steady State at Peak Systole
- Valve at Fully Open Position
- $k-\omega$ SST approach to Simulate Turbulence

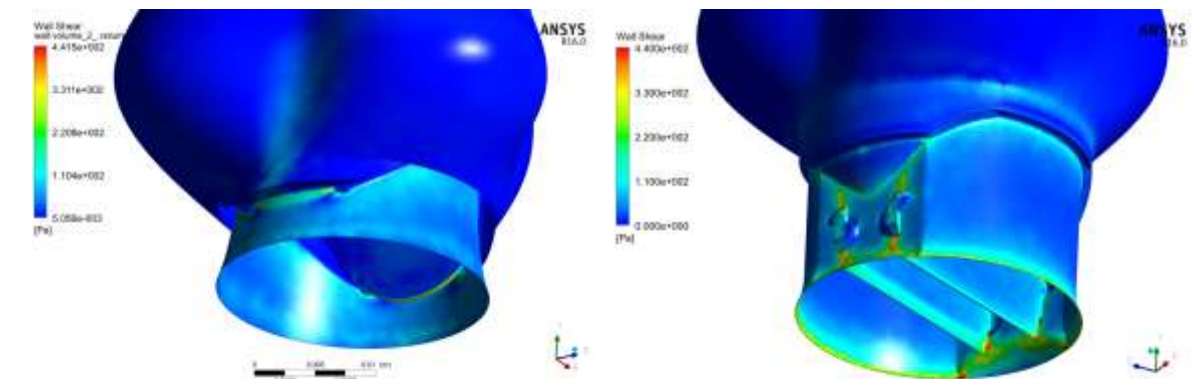
Analysis:



Newly designed valve a) in fully closed position b) in fully open position



Turbulence Kinetic Energy in Three Cross Planes for Men and Women Implanted On-X Aortic Valve in Second Period of Adult.



Wall shear stress in valve region a) in newly designed valve with lower values in hinge area b) in a conventional bileaflet valve with higher values in hinge area

