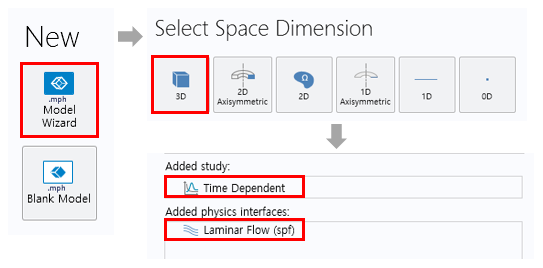
● Purpose : Simulation of heart valve model .

● Problem : Comsol don't recognize self-made valve for simulation.

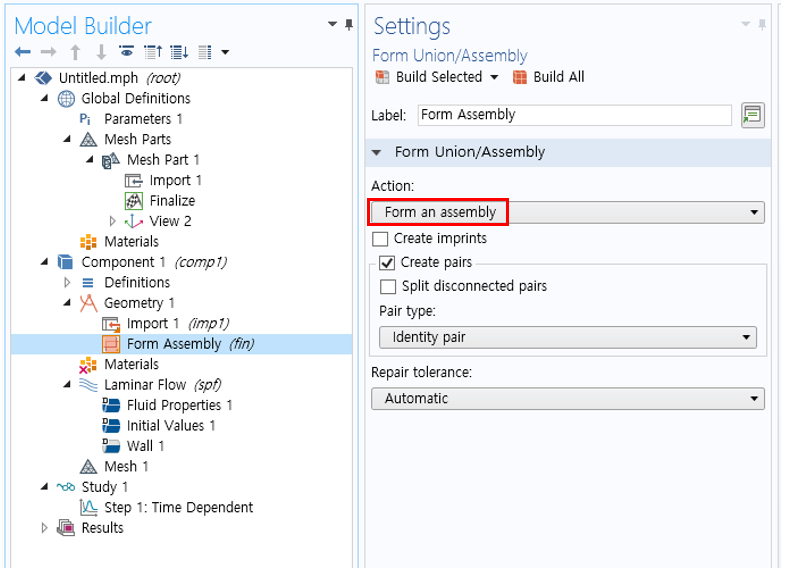
● Present setup

* model wizard - 3D – Laminar flow – time dependent

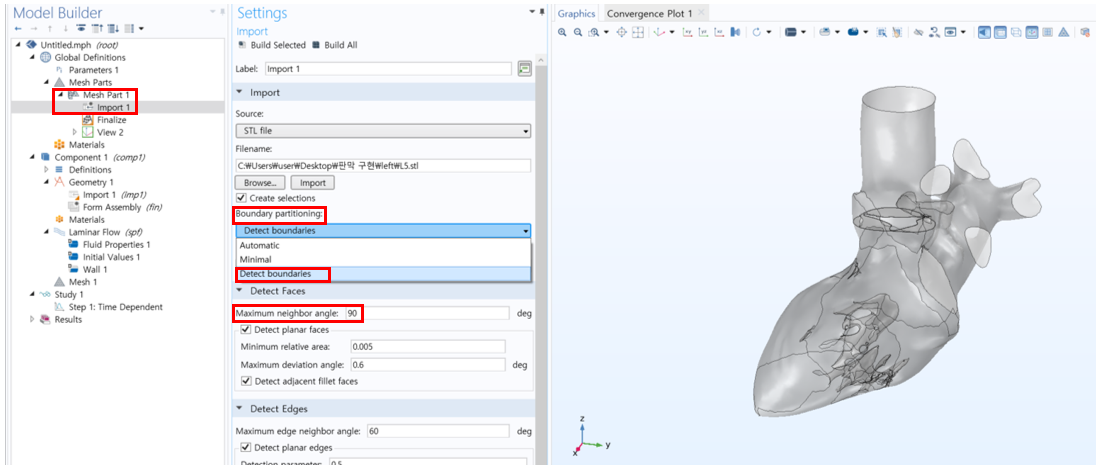


1. Process

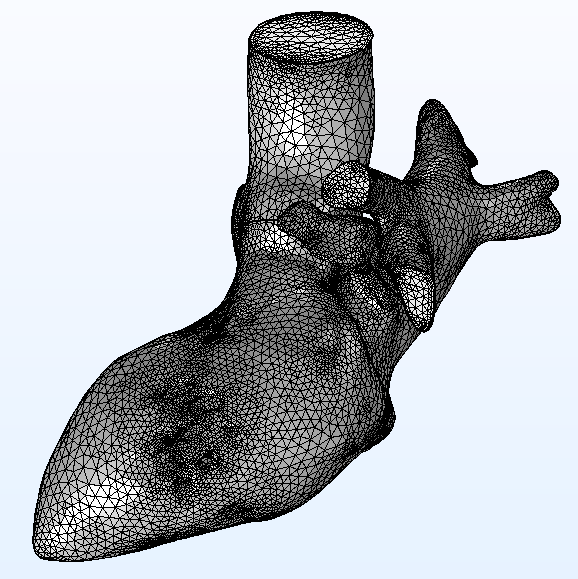
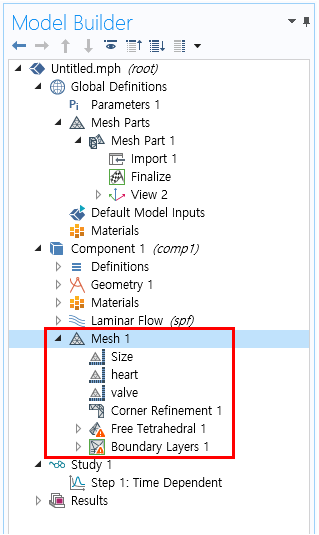
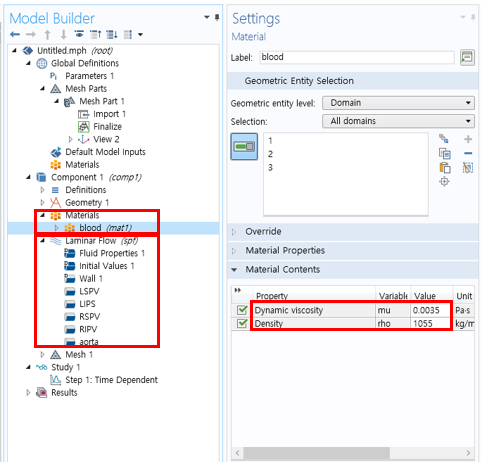
* Heart and valve models are implemented separately and then combined.
* Uncheck simplify mesh of CAD file and import.
* If set to Form a union, an error occurs, set to Form a assembly.



* Set the imported model to detect boundaries as boundary partitioning of mesh part.
* Modify the detect angle at detect boundaries to set the boundaries of the mesh.

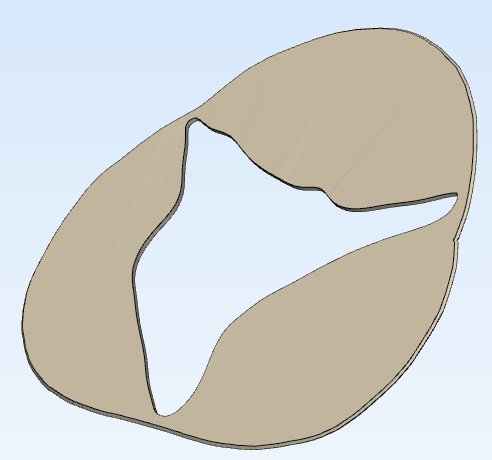
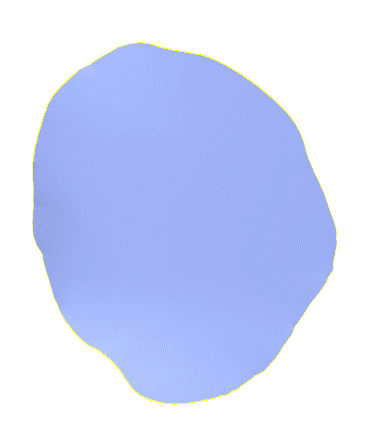


* meterials setting : density = 1055 kg/m^3, dynamic viscosity = 0.0035 Pa·s
* boundary condition setting : Pulmonary vein=inlet, Aorta=outlet, etc=wall
* mesh setting : Separately set the mesh size of the heart and valve

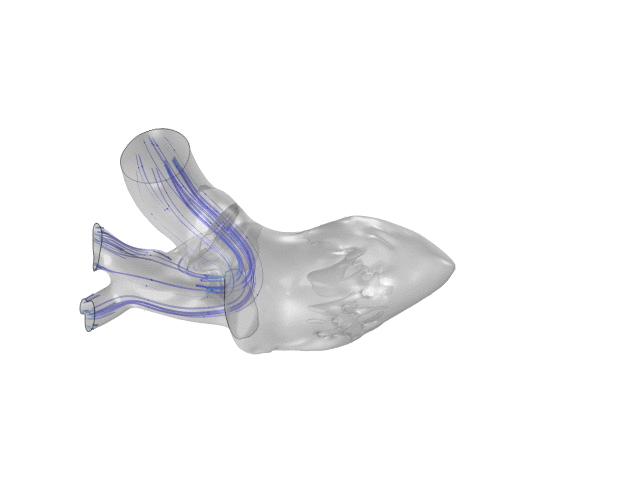
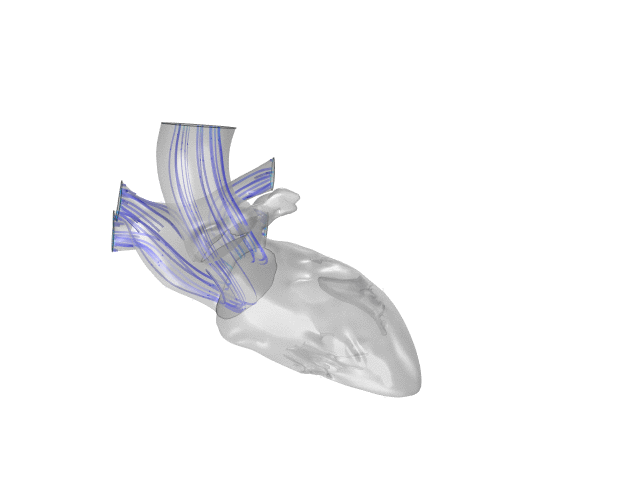
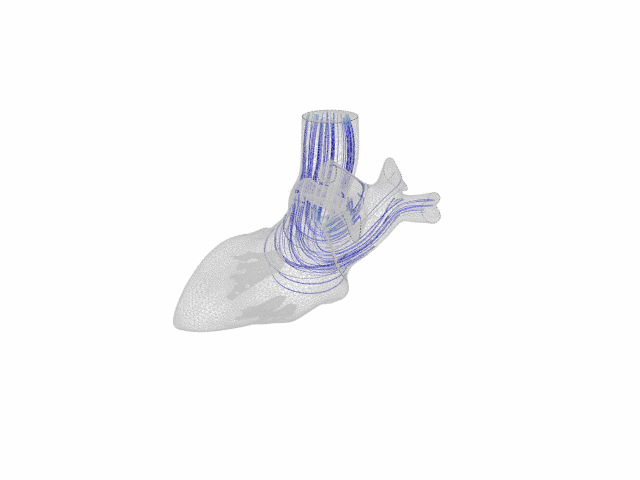


2. Problem

* Compute after completing materials, boundary conditions, and mesh settings, it will appear as follows.
* Currently used model is MV(mitral valve) close, AV(aortic valve) open.
* The MV is in close condition, but the stream line is created by passing through the blocked valve.
* Streamline should be formed only in the open part of AV, but the whole is created.

[AV] [MV]



**MV**

**AV**



**MV**

**AV**



**AV**

**MV**



[streamline]

3. Solution investigation

* If interior wall is set, valves in the model are recognized and streamlines are expected to not flow.
* But can't set interior wall.

