

# AUTOMESH

Francis99 Workshop  
15 / 12 / 2015

- Updated set of mesh (date 15/12/2015)
  - Generated by Jonathan Nicolle (IREQ) and Rémi Lestriez (NumIberica)
  - Compatible with High Reynolds turbulence models ( $Y^+ \sim 20-50$ )
  - Medium size meshes
  - Conformal grids (hexahedral or hex-dominant)
  - Includes grid patches for seal leakages
  - Computation with (very) satisfactory convergence for NUMECA and ANSYS solvers
  - Available formats: NUMECA (including mesh parameters), CGNS, MSH, OPENFOAM
- Content
  - Mesh list
  - Mesh size / First cell width
  - Meshes visualizations

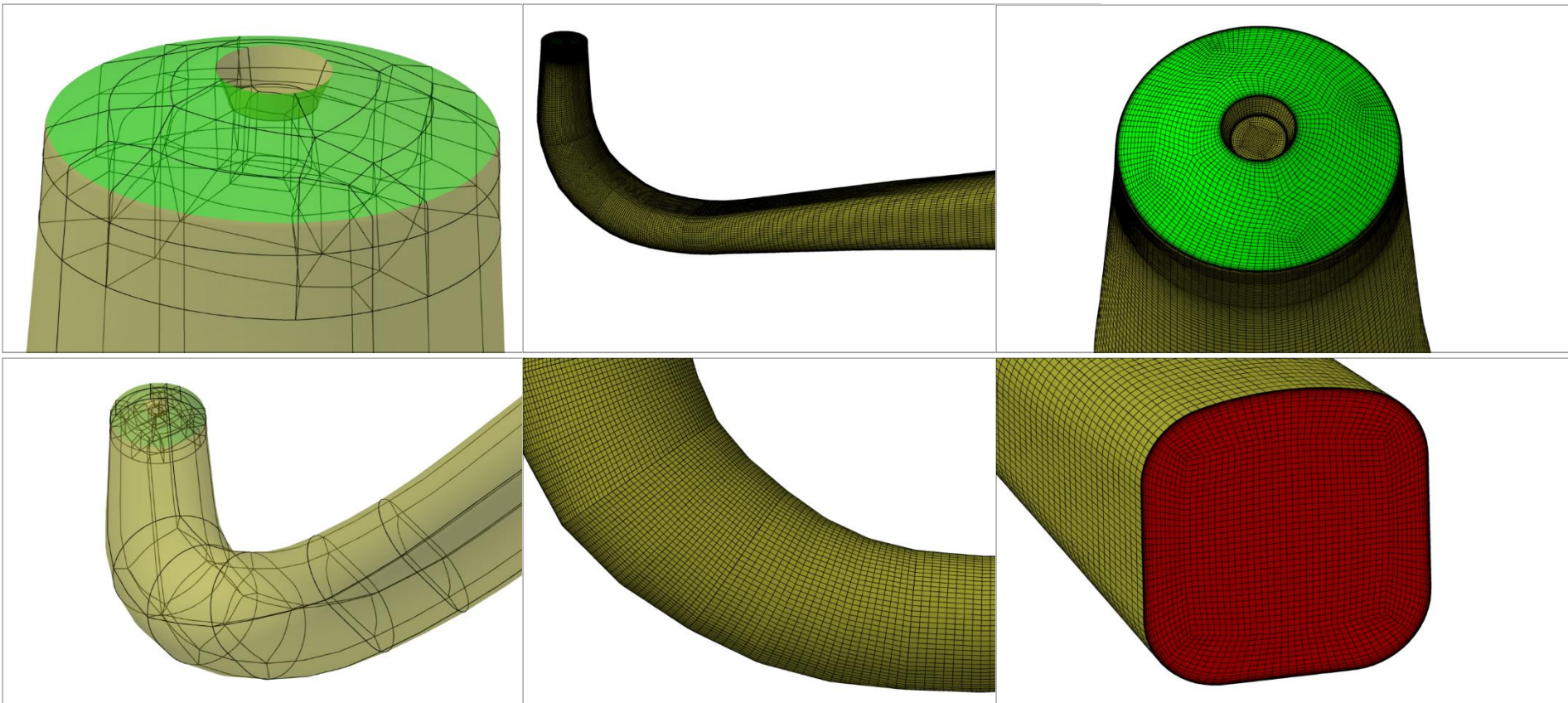
Reference	GV Opening	Geometry	AutoMesh
DT		Draft Tube	<i>External</i> + IGG
GV-03-91	3.91	Guide Vane	AutoGrid5
GV-06-72	6.72	Guide Vane	AutoGrid5
GV-09-84	9.84	Guide Vane	AutoGrid5
GV-12-44	12.44	Guide Vane	AutoGrid5
RU		Runner	AutoGrid5
RU-CO		Runner + Cone	AutoGrid5
SC-SV		Spiral Casing + Stay Vane ring	Hexpress/Hybrid
SV-GV-03-91	3.91	1 Stay Vane + 2 Guide Vane	AutoGrid5
SV-GV-06-72	6.72	1 Stay Vane + 2 Guide Vane	AutoGrid5
SV-GV-09-84	9.84	1 Stay Vane + 2 Guide Vane	AutoGrid5
SV-GV-12-44	12.44	1 Stay Vane + 2 Guide Vane	AutoGrid5

# Mesh size

## First cell width

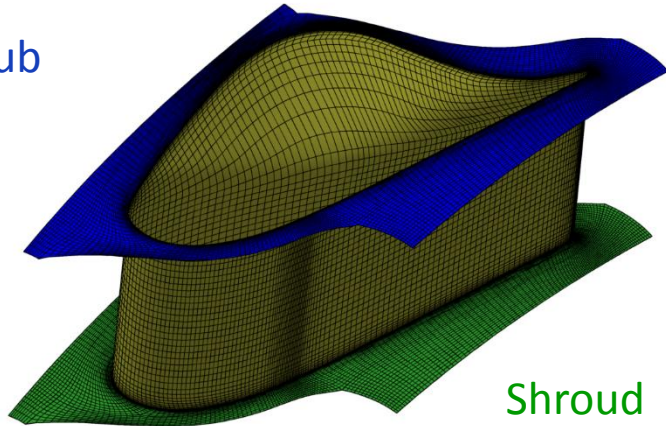
Reference	Number of cells	First cell width at wall
DT	1011117	Inlet 0.3 mm / Outlet 0.8 mm
GV-03-91	319103	Guide Vane 0.1 mm Hub & Shroud 0.2 mm
GV-06-72	319103	
GV-09-84	319103	
GV-12-44	319103	
RU	794252	
RU-CO	1079013	0.2 mm
SC-SV	3427708	0.3 mm
SV-GV-03-91	939556	Stay Vane 0.3 mm / Guide Vane 0.1 mm Hub & Shroud 0.3 to 0.2 mm
SV-GV-06-72	939556	
SV-GV-09-84	939556	
SV-GV-12-44	939556	



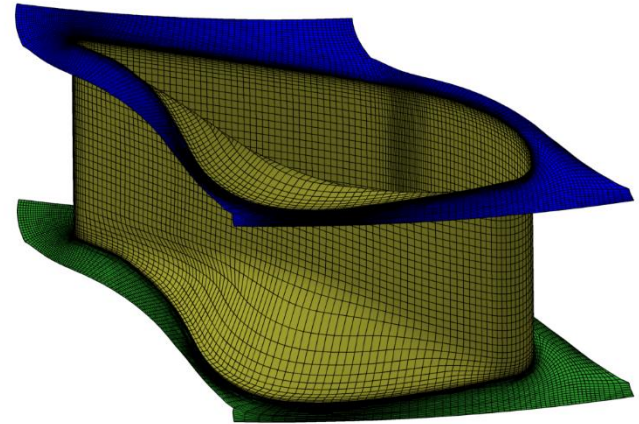


Mesh size	Angle	Aspect Ratio	Expansion Ratio
	Min	Max	Max
1011117	36.2	197	2.6

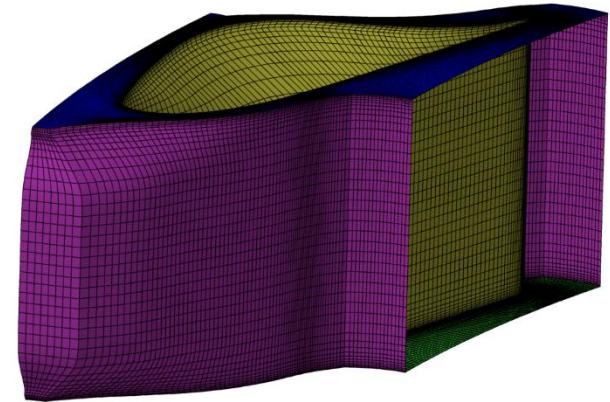
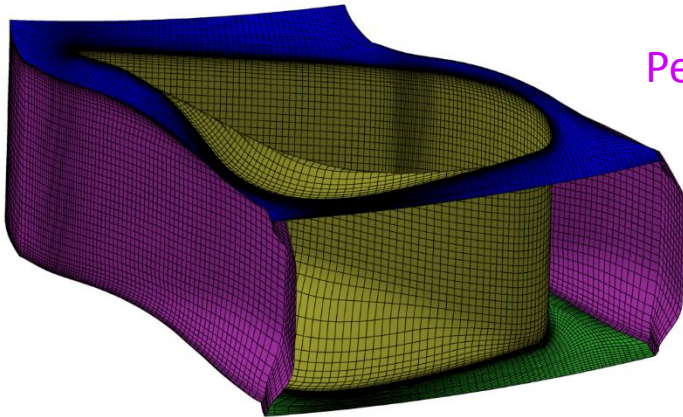
Hub



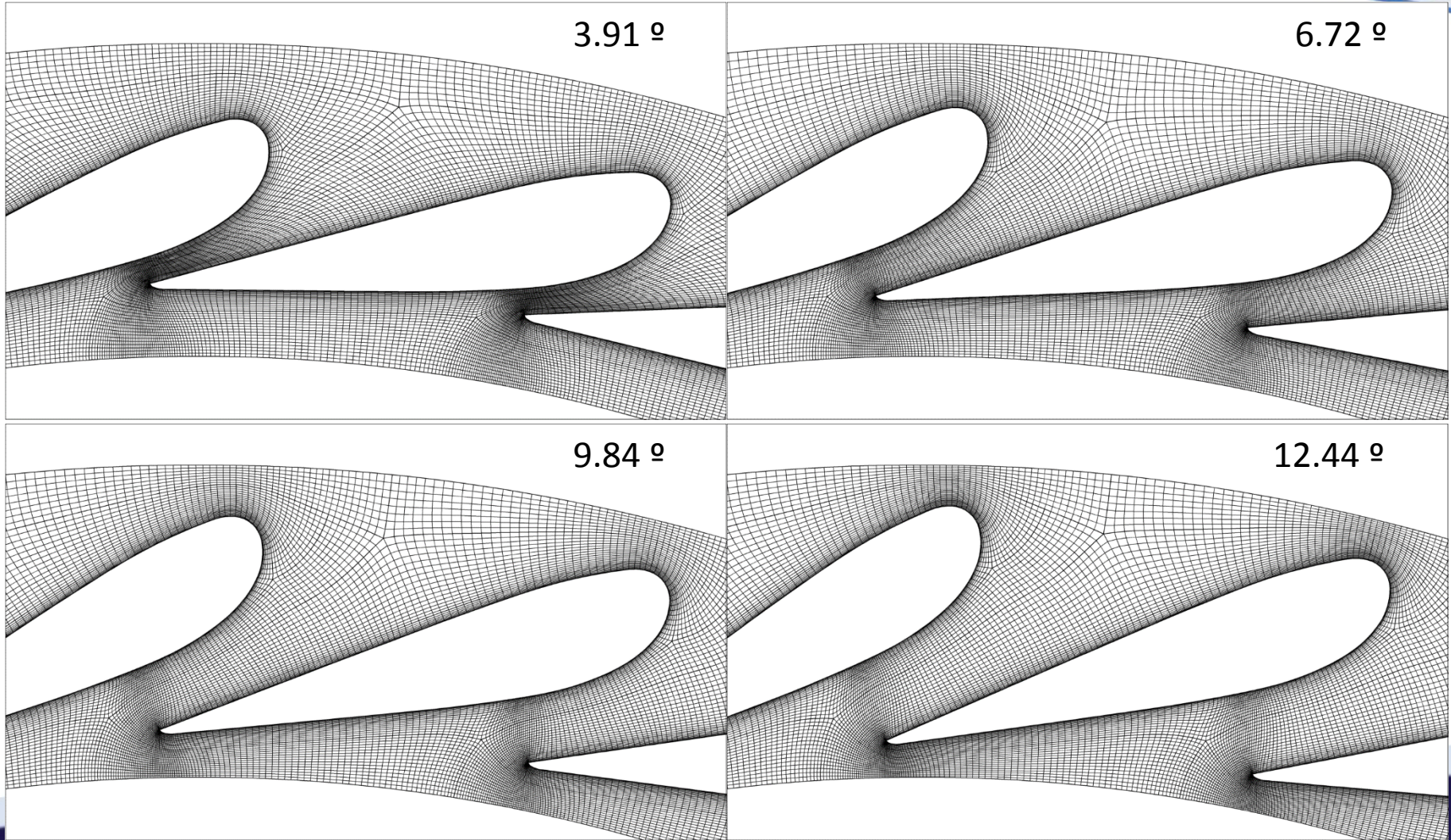
Shroud



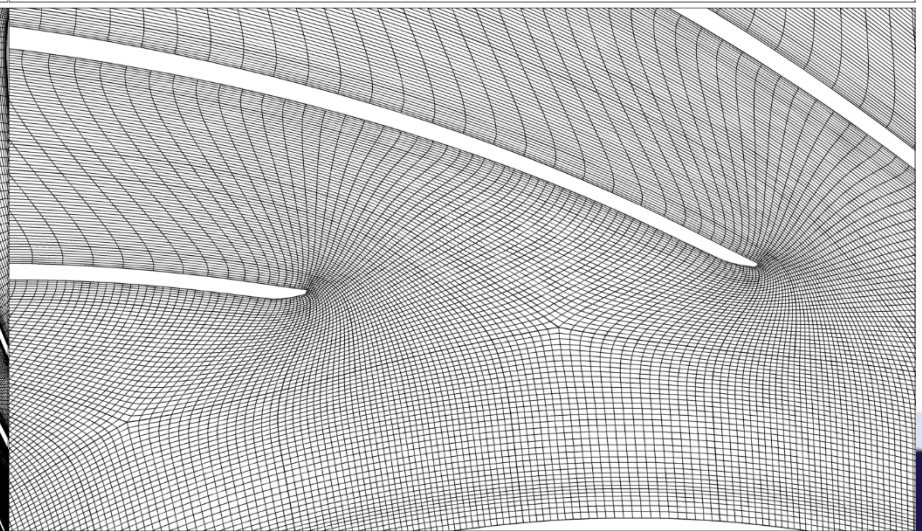
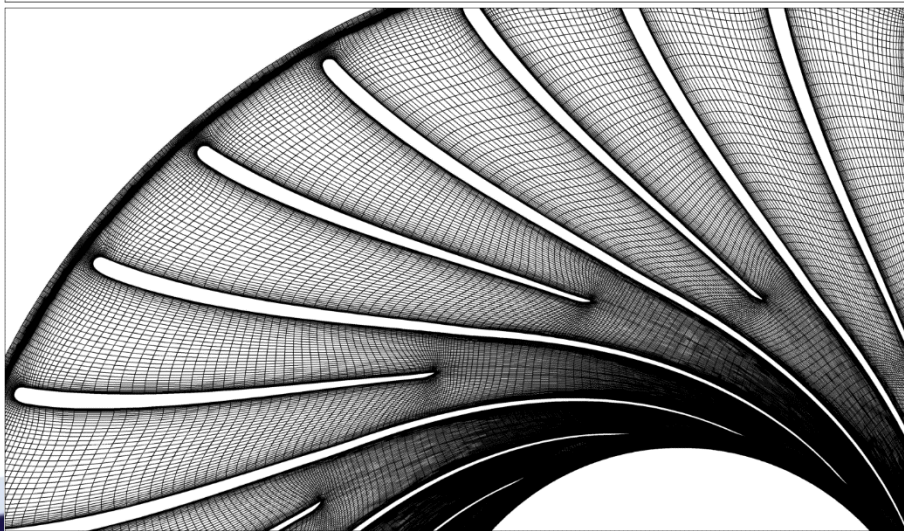
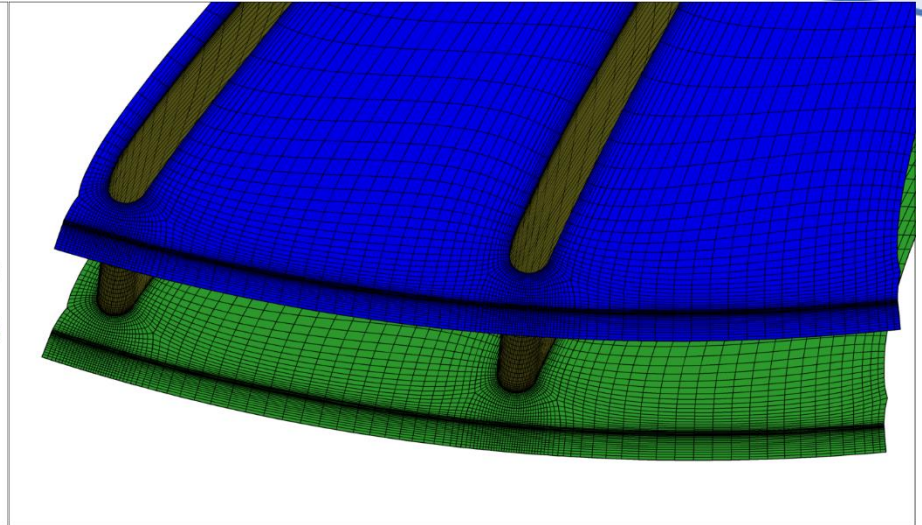
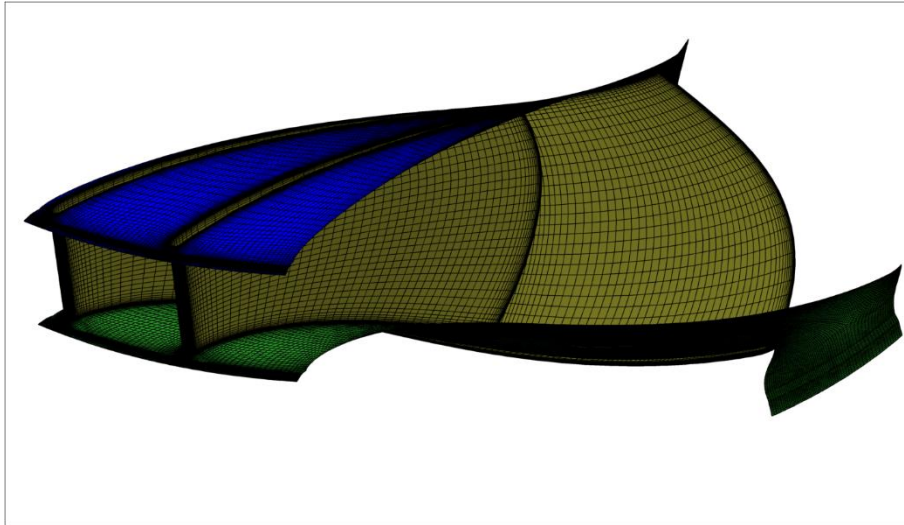
Periodic faces



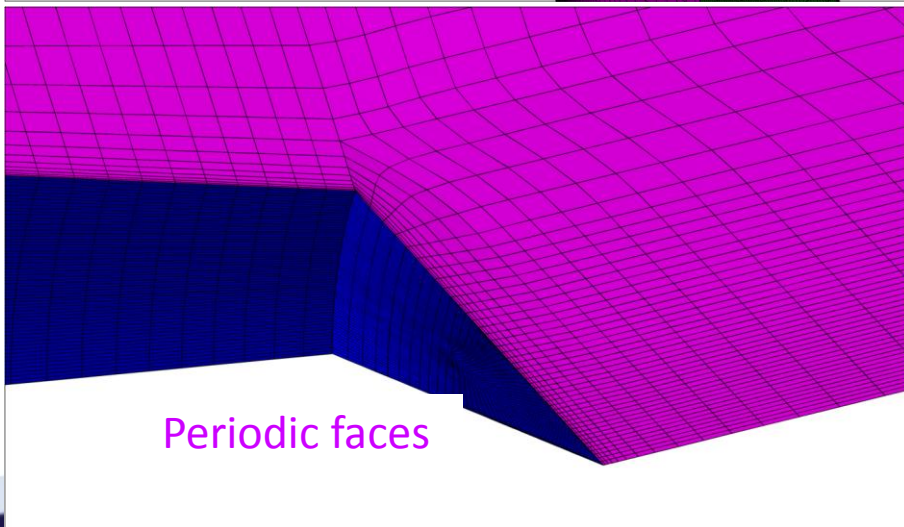
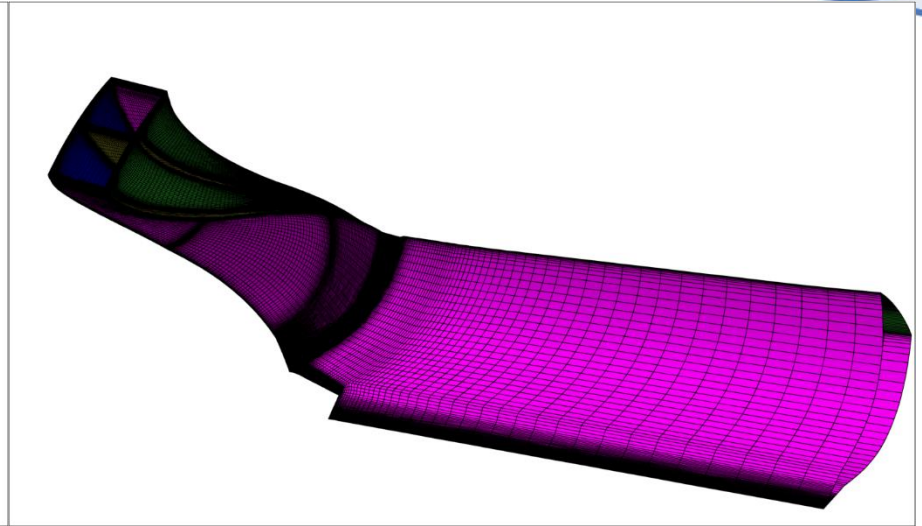
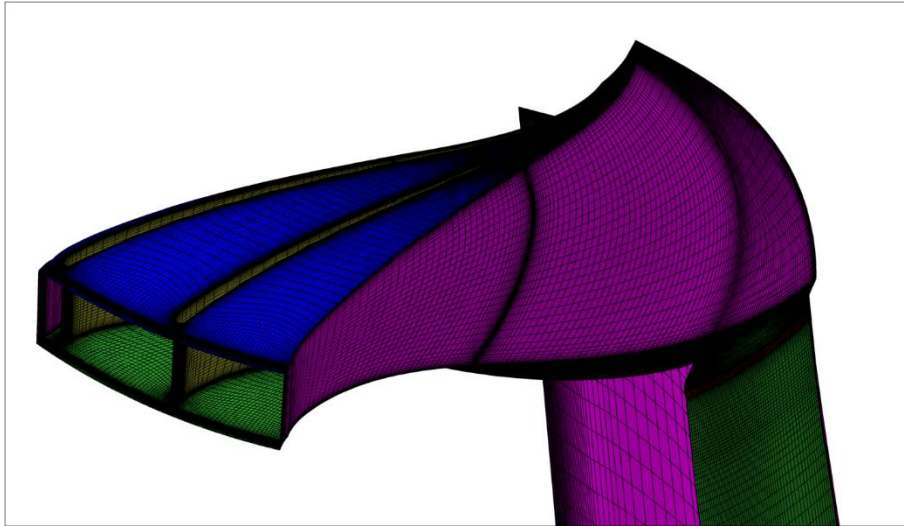






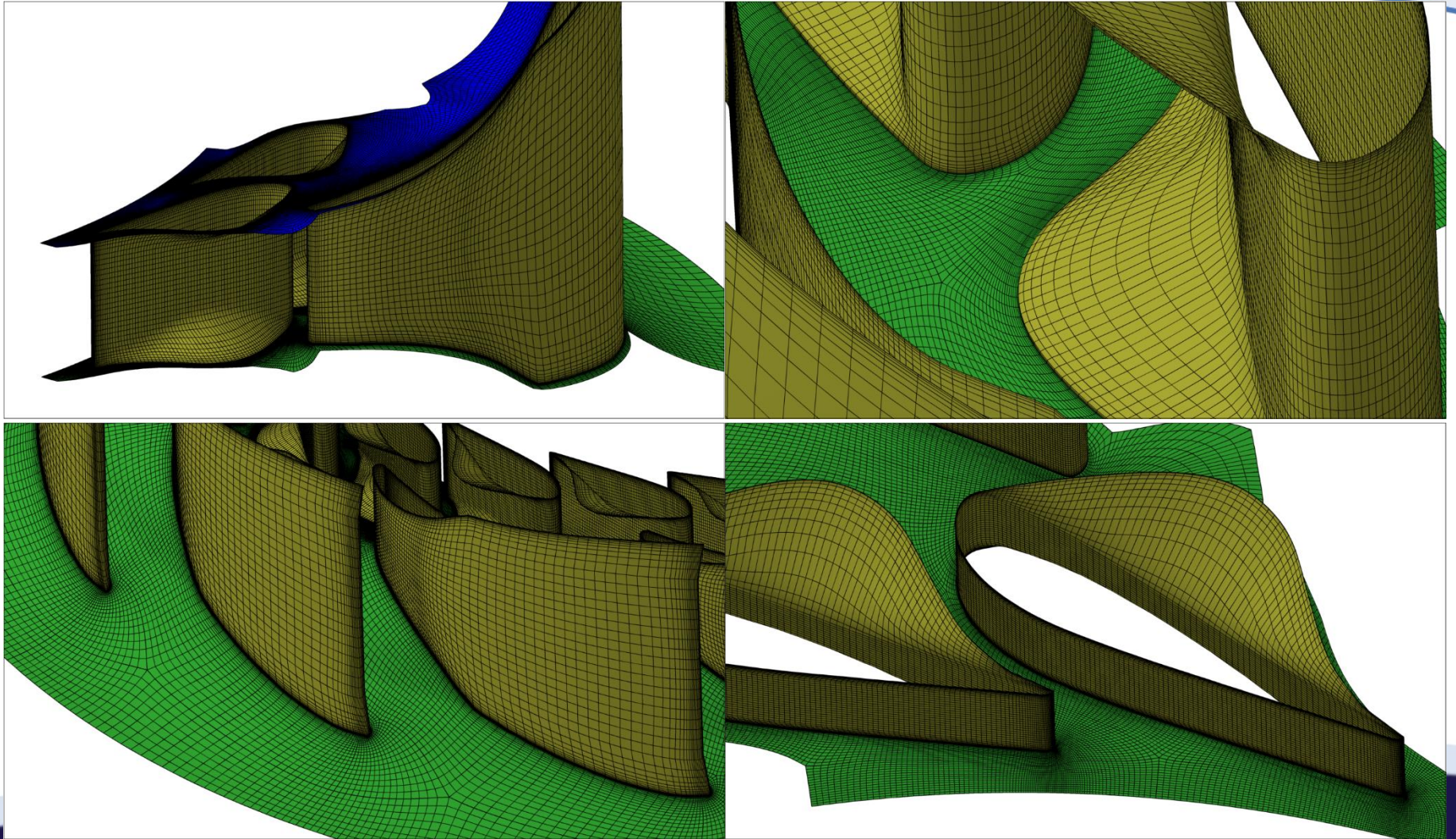




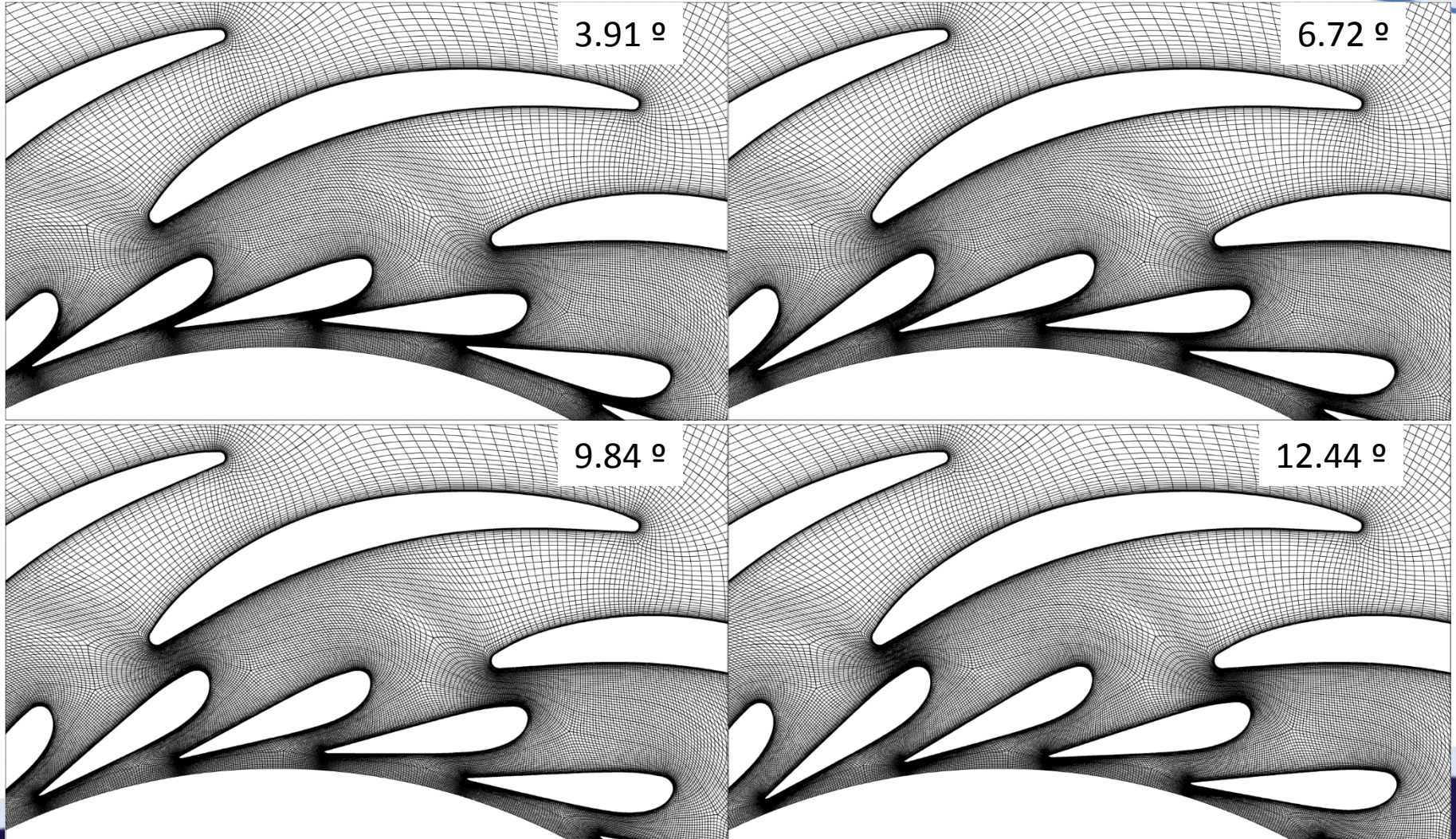


- “Bulb” topology in the cone :
- mesh till axis ( $r=0$ )
  - $\frac{1}{4}$  butterfly topology
  - Fully matching



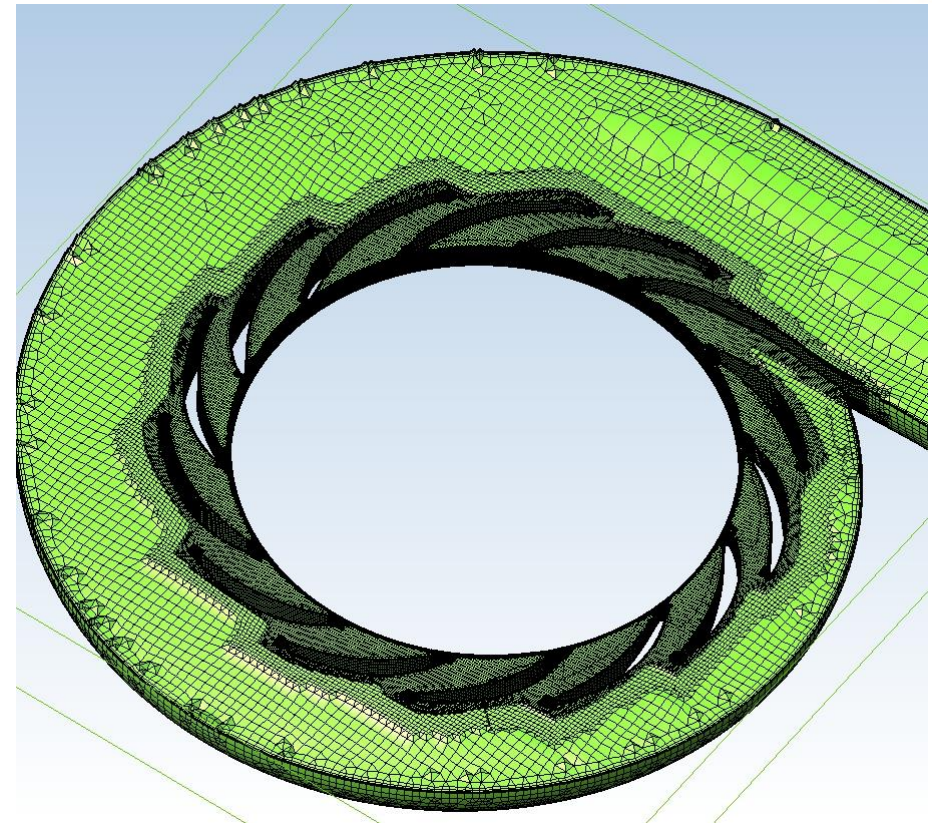
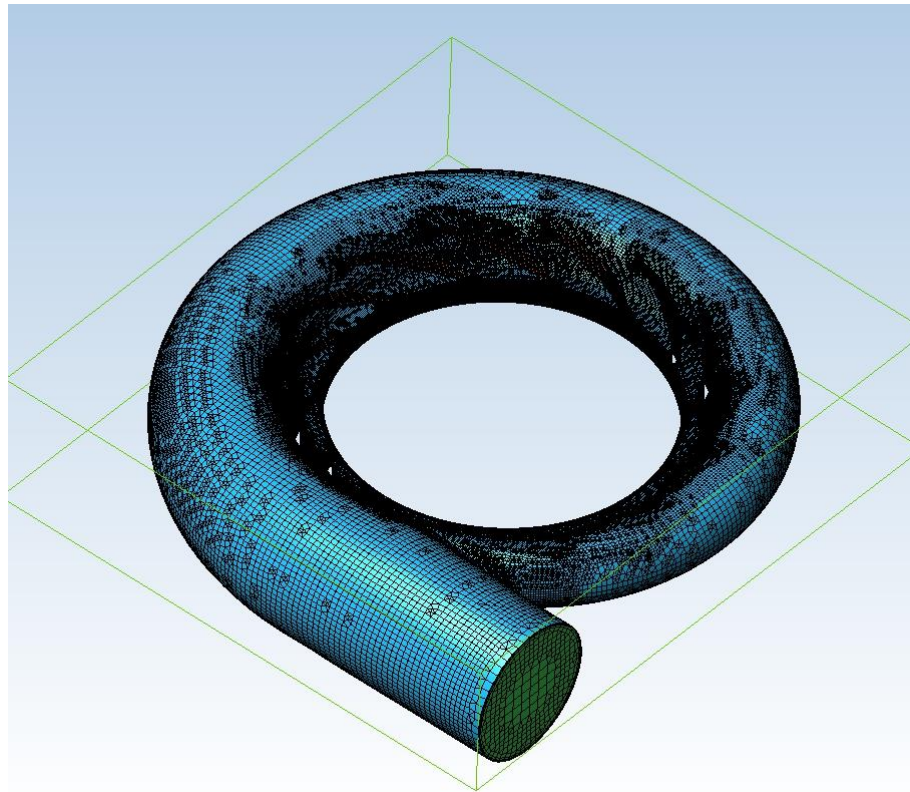






Reference	Mesh size	Angle		Aspect Ratio		Expansion Ratio	
		Min	Average	Max	Average	Max	Average
GV-03-91	319103	<b>7.4</b>	75.5	<b>53.2</b>	6.9	<b>2.9</b>	1.2
GV-06-72	319103	<b>20.8</b>	79.2	<b>56.0</b>	7.0	<b>2.4</b>	1.2
GV-09-84	319103	<b>25.0</b>	79.8	<b>55.9</b>	7.0	<b>2.4</b>	1.2
GV-12-44	319103	<b>25.0</b>	79.9	<b>55.7</b>	7.0	<b>2.5</b>	1.2
RU	794252	<b>36.8</b>	76.5	<b>56.3</b>	7.7	<b>1.7</b>	1.1
RU-CO	1079013	<b>24.0</b>	76.2	<b>326.2</b>	13.6	<b>3.0</b>	1.2
SV-GV-03-91	939556	<b>18.8</b>	76.2	<b>52.7</b>	6.2	<b>3.3</b>	1.2
SV-GV-06-72	939556	<b>24.5</b>	77.6	<b>52.7</b>	6.2	<b>2.7</b>	1.2
SV-GV-09-84	939556	<b>24.8</b>	77.8	<b>52.7</b>	6.2	<b>2.7</b>	1.2
SV-GV-12-44	939556	<b>24.8</b>	77.9	<b>52.7</b>	6.3	<b>2.7</b>	1.2





Mesh size	Hexahedrons	Prisms	Pyramids	Tetras
3427708	2233479	920880	154995	118354
	65.2%	26.9%	4.5%	3.5%



