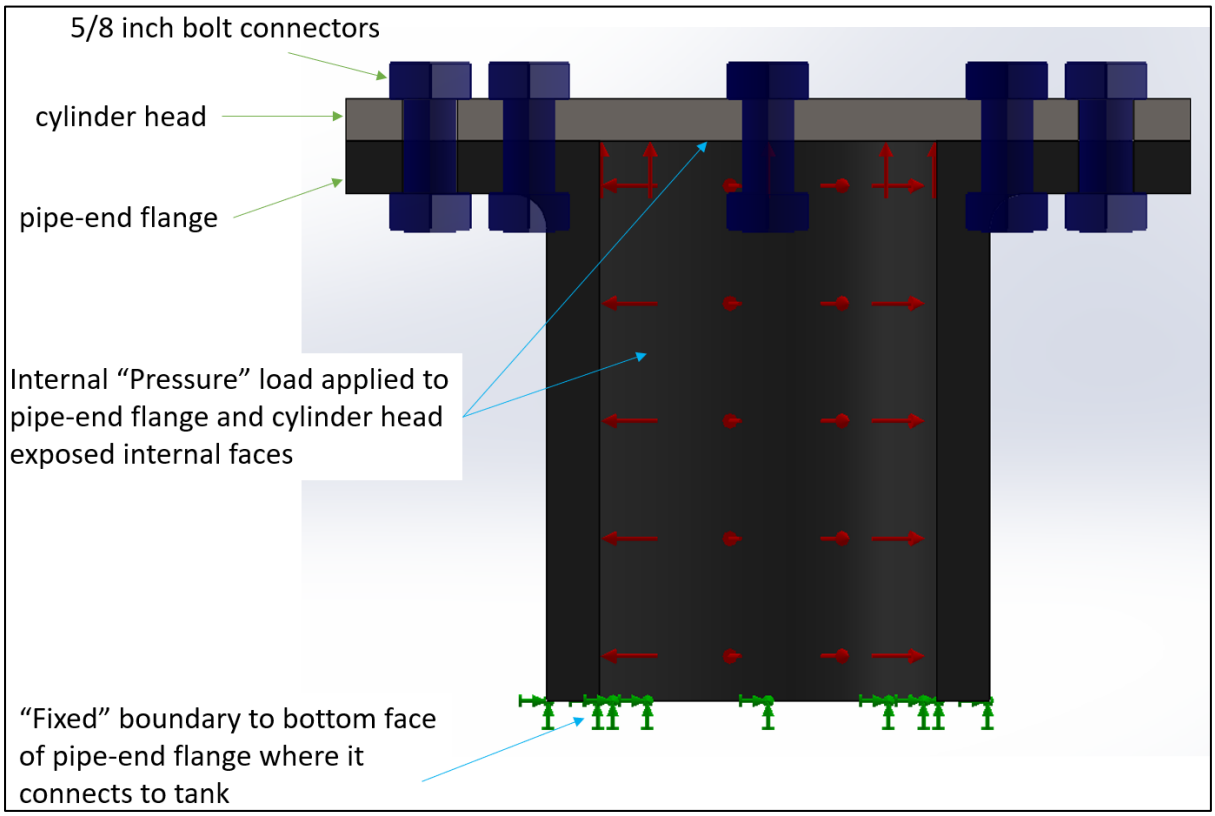
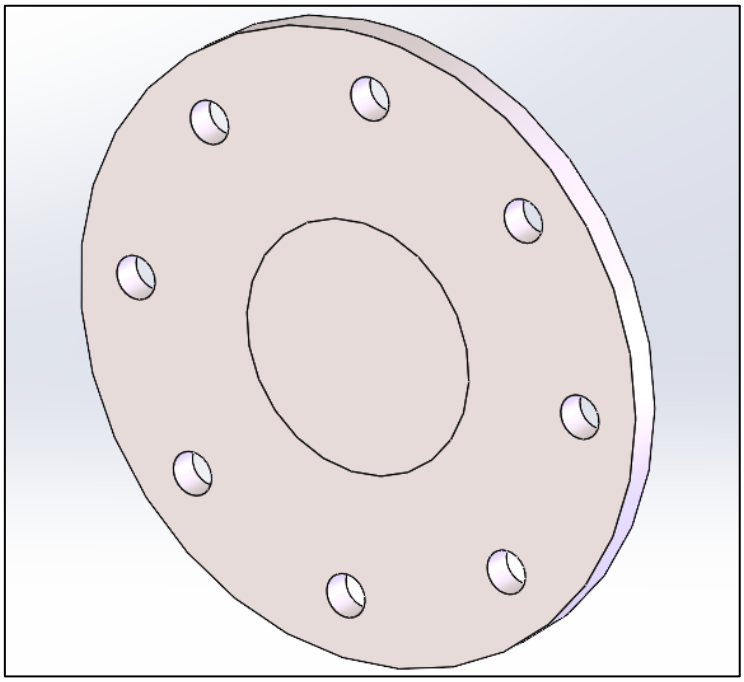
a. All boundary conditions applied to the model:

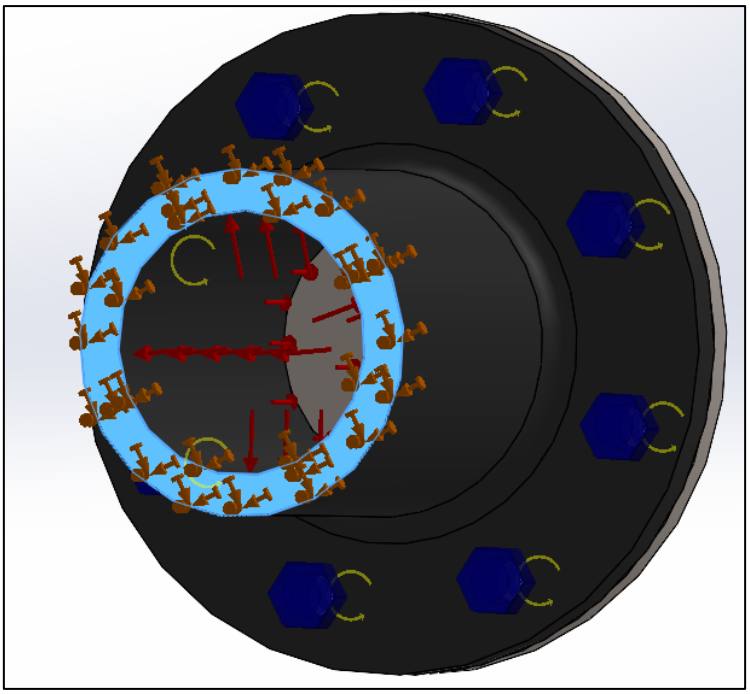
A screenshot showing all boundary conditions applied to the model shown below:



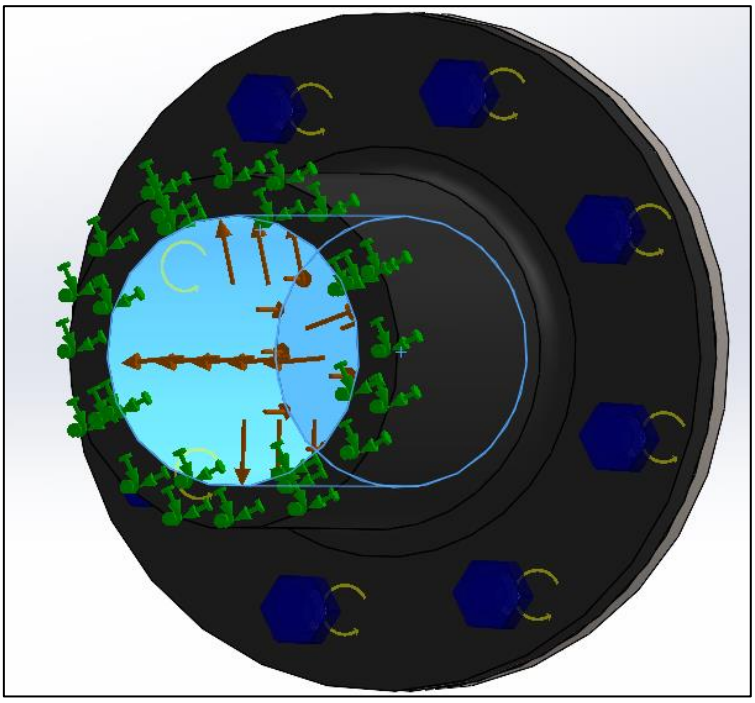
A split line was created on the cylinder head to apply internal pressure on exposed surface as shown below:



Fixed support applied to bottom of pipe-end flange as shown below:

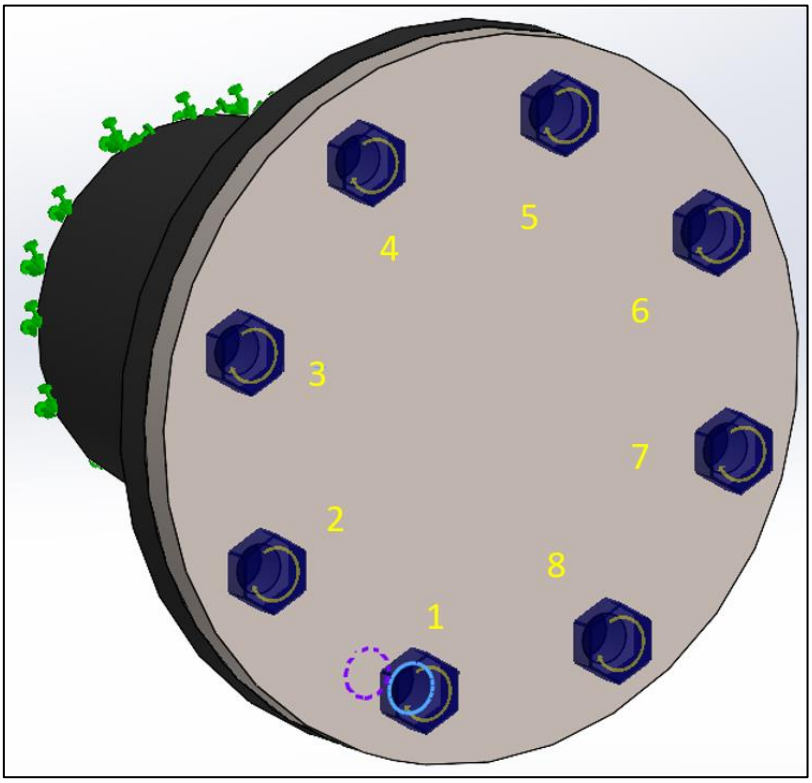


Pressure applied to internal surfaces of pipe-end flange and exposed portion of cylinder head (partitioned by split line) shown below:



b. Determine the load in bolts:

Bolt connector naming and locations shown below:



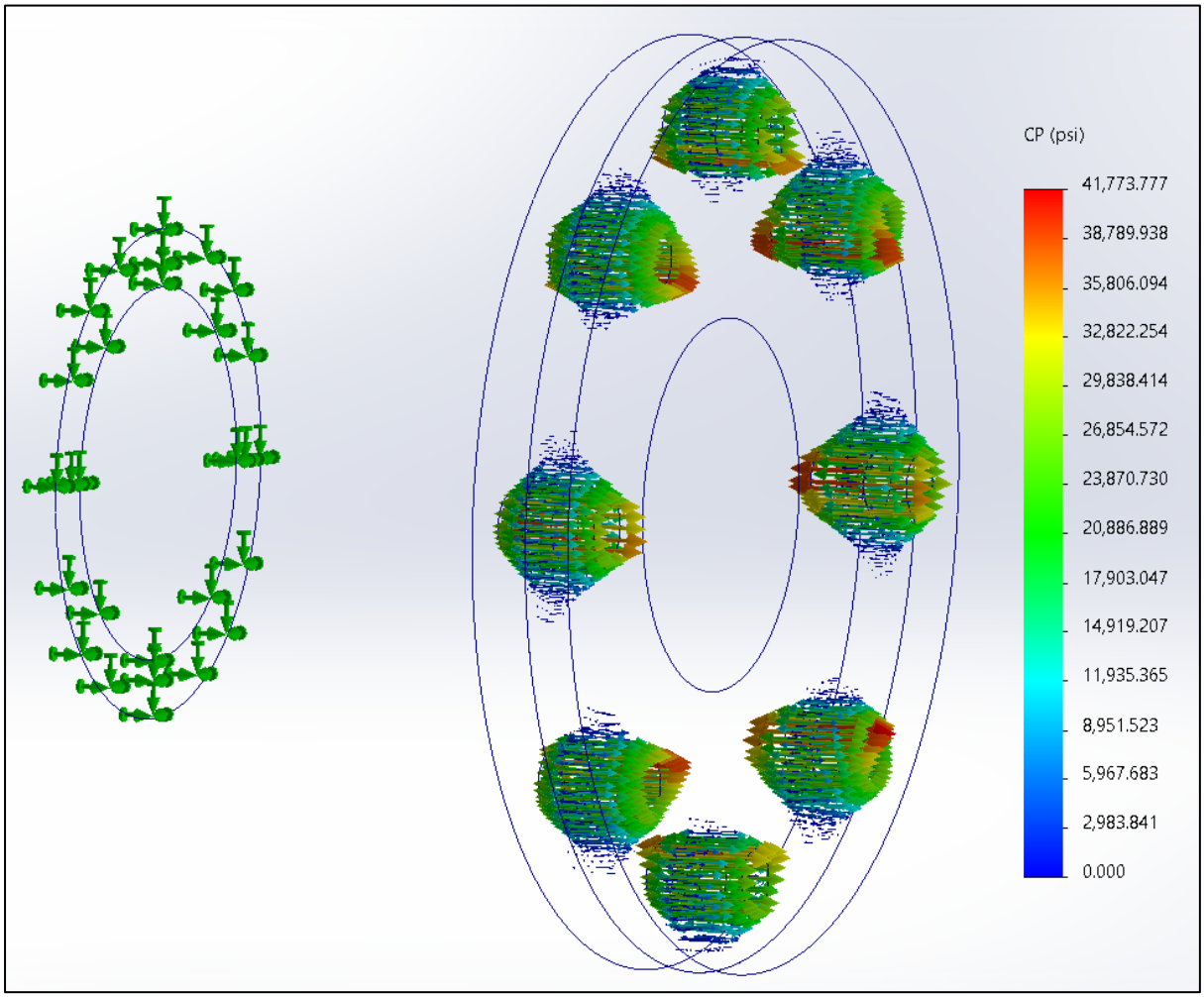
The result table for loads in bolts is shown below:

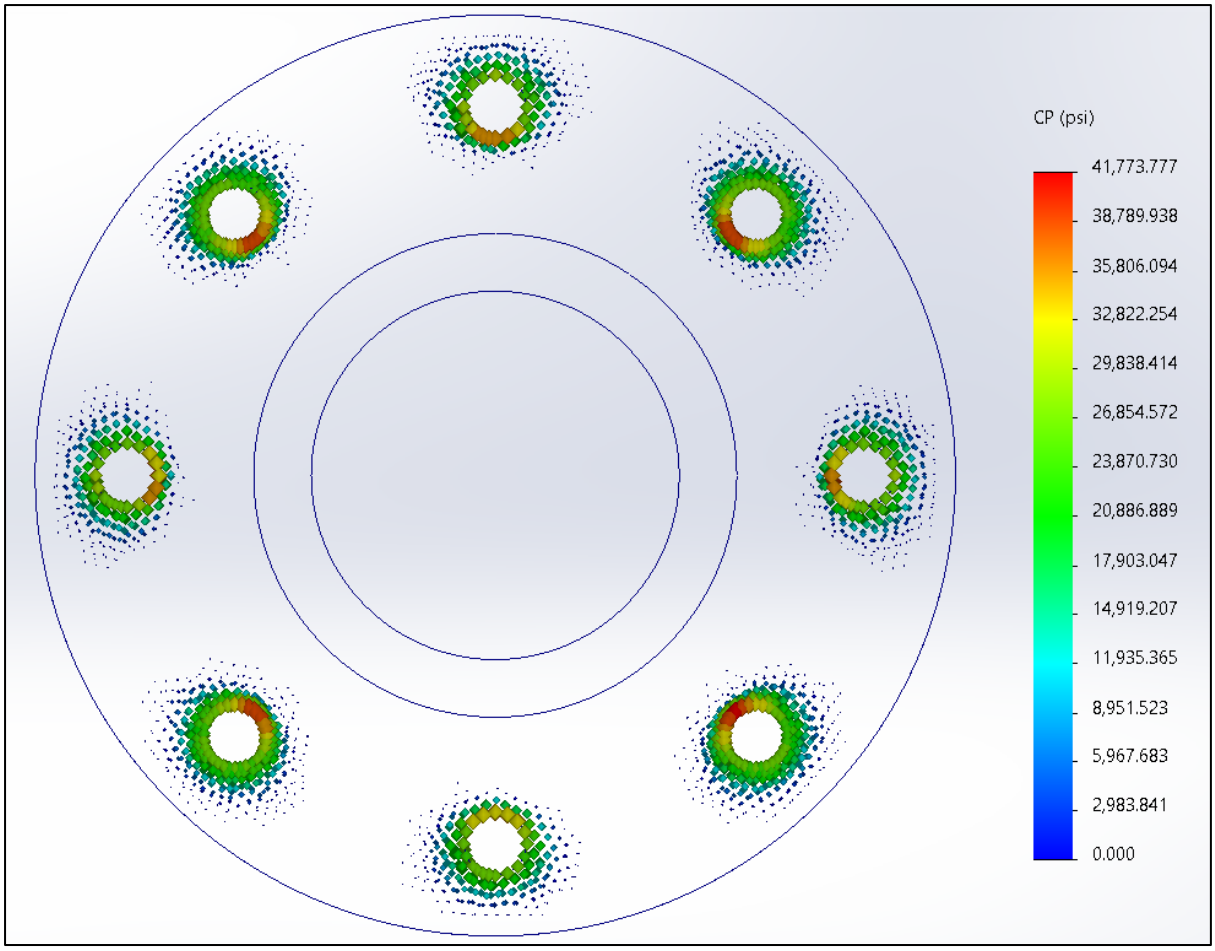
Type	Resultant	X-Component	Y-Component	Z-Component	Connector
Shear Force (lbf)	367.25	-257.81	0	-261.55	Counterbore with Nut-1
Axial Force (lbf)	20083	0	20083	0	Counterbore with Nut-1
Bending moment (lbf.in)	215.79	152.42	0	-152.75	Counterbore with Nut-1
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-1
Shear Force (lbf)	379.08	-2.05	0	-379.07	Counterbore with Nut-2
Axial Force (lbf)	20086	0	20086	0	Counterbore with Nut-2
Bending moment (lbf.in)	220.22	220.21	0	-1.5457	Counterbore with Nut-2
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-2
Shear Force (lbf)	371.91	265.42	0	-260.51	Counterbore with Nut-3

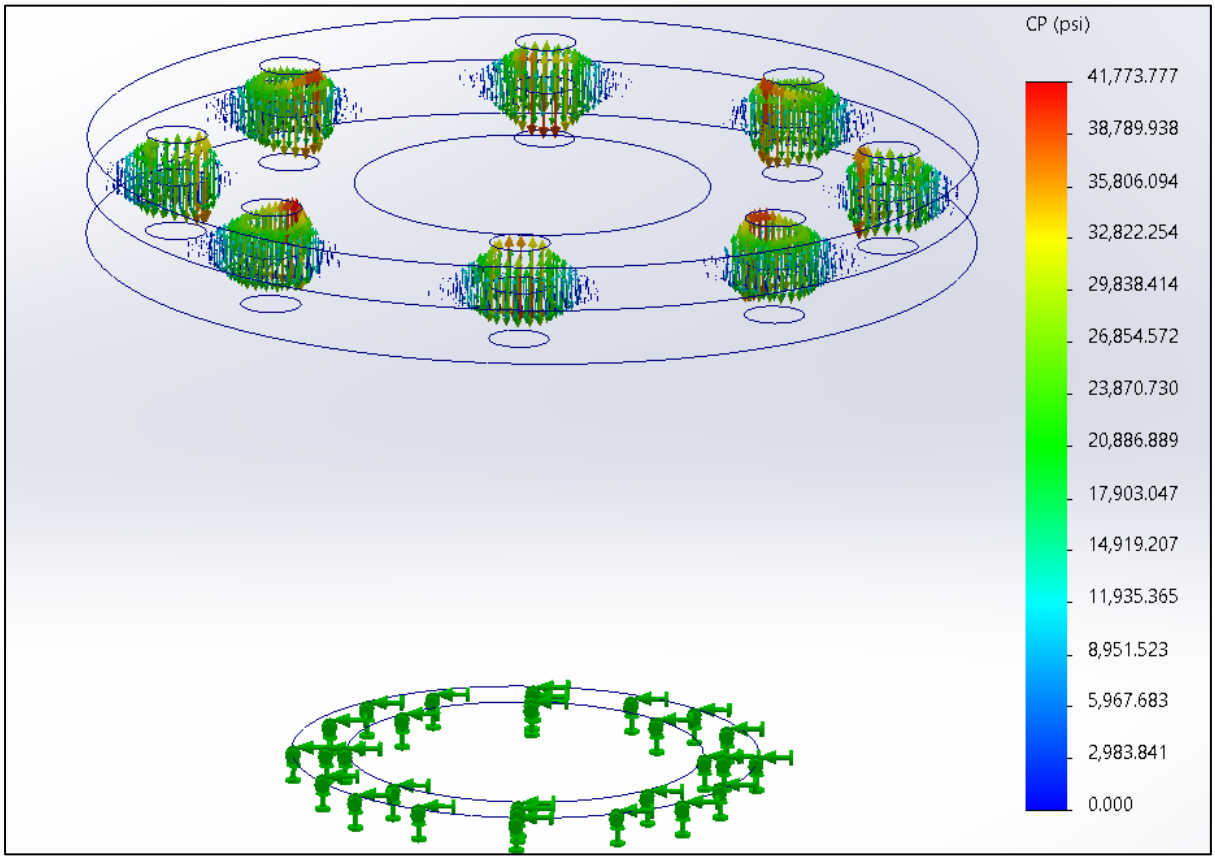
Axial Force (lbf)	20089	0	20089	0	Counterbore with Nut-3
Bending moment (lbf.in)	220.26	152.74	0	158.7	Counterbore with Nut-3
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-3
Shear Force (lbf)	372.62	372.61	0	-2.2241	Counterbore with Nut-4
Axial Force (lbf)	20090	0	20090	0	Counterbore with Nut-4
Bending moment (lbf.in)	221.99	-0.54272	0	221.98	Counterbore with Nut-4
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-4
Shear Force (lbf)	371.37	261.13	0	264.06	Counterbore with Nut-5
Axial Force (lbf)	20087	0	20087	0	Counterbore with Nut-5
Bending moment (lbf.in)	224.12	-158.46	0	158.49	Counterbore with Nut-5
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-5
Shear Force (lbf)	372.58	0.19425	0	372.58	Counterbore with Nut-6
Axial Force (lbf)	20084	0	20084	0	Counterbore with Nut-6
Bending moment (lbf.in)	221.55	-221.55	0	-0.10191	Counterbore with Nut-6
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-6
Shear Force (lbf)	374.38	-260.6	0	268.8	Counterbore with Nut-7
Axial Force (lbf)	20085	0	20085	0	Counterbore with Nut-7
Bending moment (lbf.in)	221.18	-159.77	0	-152.96	Counterbore with Nut-7
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-7
Shear Force (lbf)	378.91	-378.91	0	-2.0719	Counterbore with Nut-8
Axial Force (lbf)	20086	0	20086	0	Counterbore with Nut-8
Bending moment (lbf.in)	224.56	-0.97034	0	-224.56	Counterbore with Nut-8
Torque (lbf.in)	0	0	0	0	Counterbore with Nut-8

c. Vector plot of contact pressure (CP) between the column and plate:

Screenshots with different views to illustrate the contact pressure shown below:




CP (psi)
41,773.777
38,789.938
35,806.094
32,822.254
29,838.414
26,854.572
23,870.730
20,886.889
17,903.047
14,919.207
11,935.365
8,951.523
5,967.683
2,983.841
0.000


CP (psi)
41,773.777
38,789.938
35,806.094
32,822.254
29,838.414
26,854.572
23,870.730
20,886.889
17,903.047
14,919.207
11,935.365
8,951.523
5,967.683
2,983.841
0.000