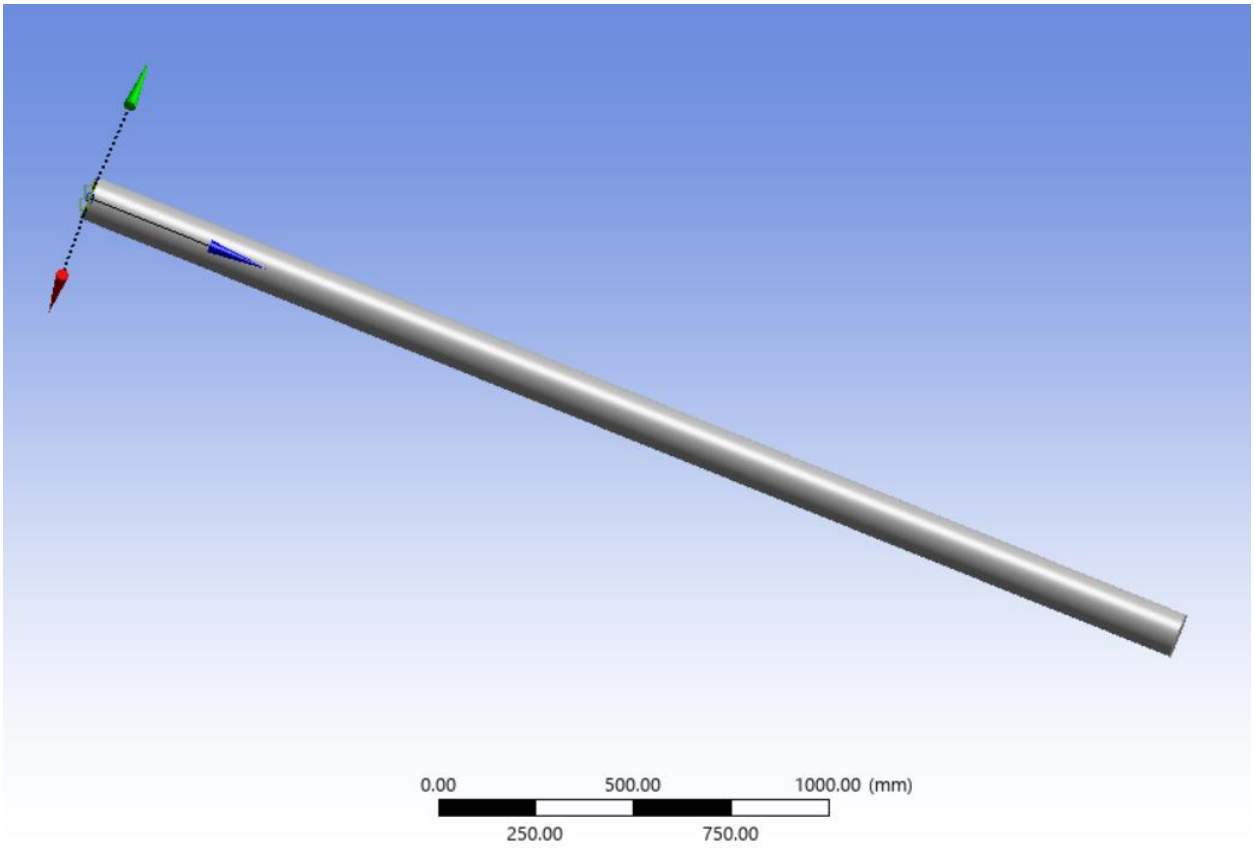
Project 14: ANSYS static structural: Comparison between deformation of two pipe materials.

Problem Statement: Calculate the comparative deformation of a 3m long pipe (stainless steel vs structural steel).

Geometry:

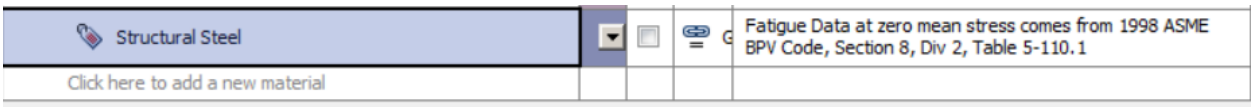


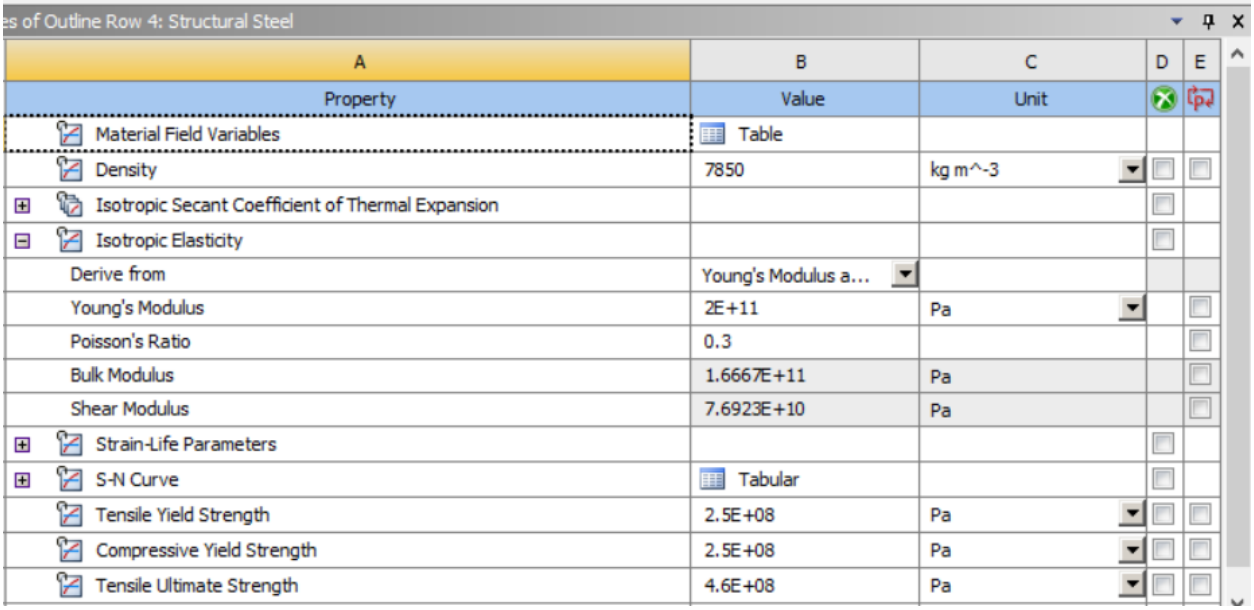
Material Properties:

Stainless Steel				
Structural Steel				Fatigue Data at zero mean stress comes from 1998 ASME BPV Code, Section 8, Div 2, Table 5-110.1
Click here to add a new material				

es of Outline Row 3: Stainless Steel

A	B	C	D	E
Property	Value	Unit		
Material Field Variables	Table			
Density	7750	kg m^-3		
Isotropic Secant Coefficient of Thermal Expansion				
Isotropic Elasticity				
Derive from	Young's Modulus an...			
Young's Modulus	1.93E+11	Pa		
Poisson's Ratio	0.31			
Bulk Modulus	1.693E+11	Pa		
Shear Modulus	7.3664E+10	Pa		
Tensile Yield Strength	2.07E+08	Pa		
Compressive Yield Strength	2.07E+08	Pa		
Tensile Ultimate Strength	5.86E+08	Pa		
Compressive Ultimate Strength	0	Pa		

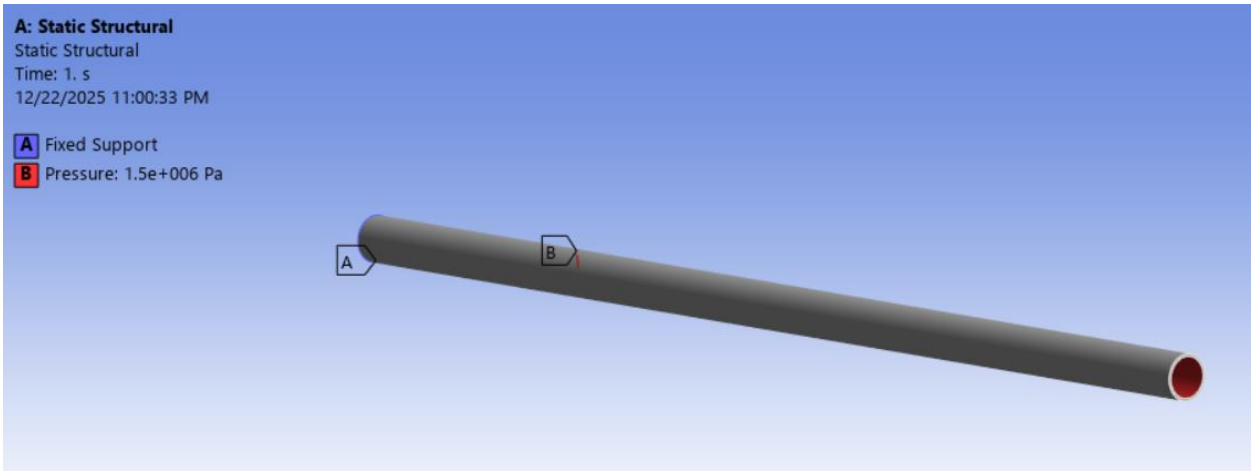




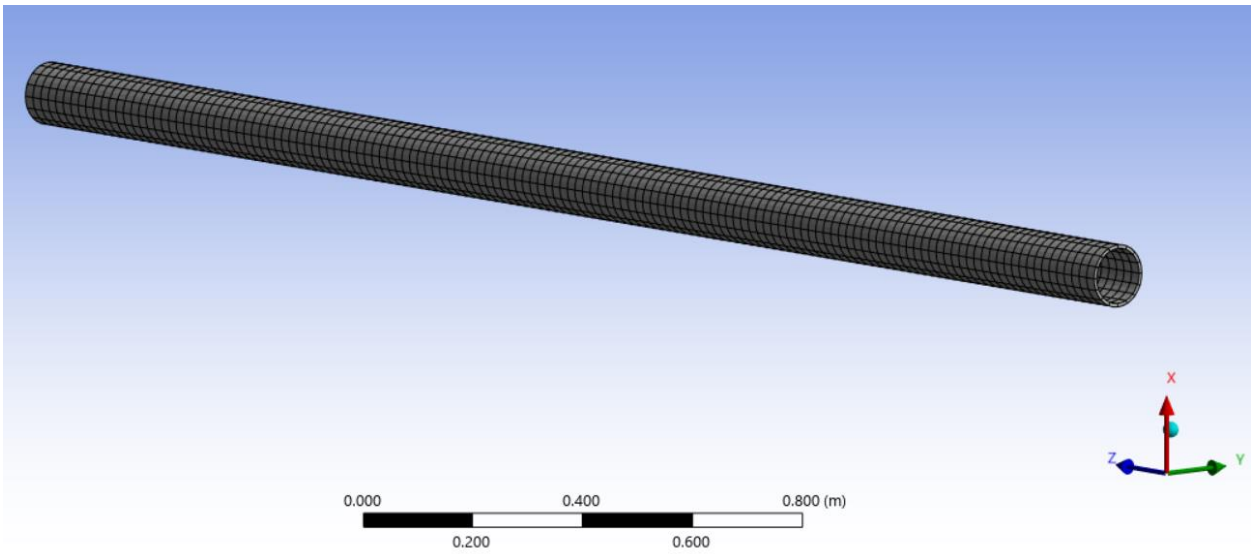
A	B	C	D	E
Property	Value	Unit		
Material Field Variables	Table			
Density	7850	kg m^-3		
Isotropic Secant Coefficient of Thermal Expansion				
Isotropic Elasticity				
Derive from	Young's Modulus a...			
Young's Modulus	2E+11	Pa		
Poisson's Ratio	0.3			
Bulk Modulus	1.6667E+11	Pa		
Shear Modulus	7.6923E+10	Pa		
Strain-Life Parameters				
S-N Curve	Tabular			
Tensile Yield Strength	2.5E+08	Pa		
Compressive Yield Strength	2.5E+08	Pa		
Tensile Ultimate Strength	4.6E+08	Pa		

Boundary Conditions:

Left edge is fixed. Inner surface has pressure loading.

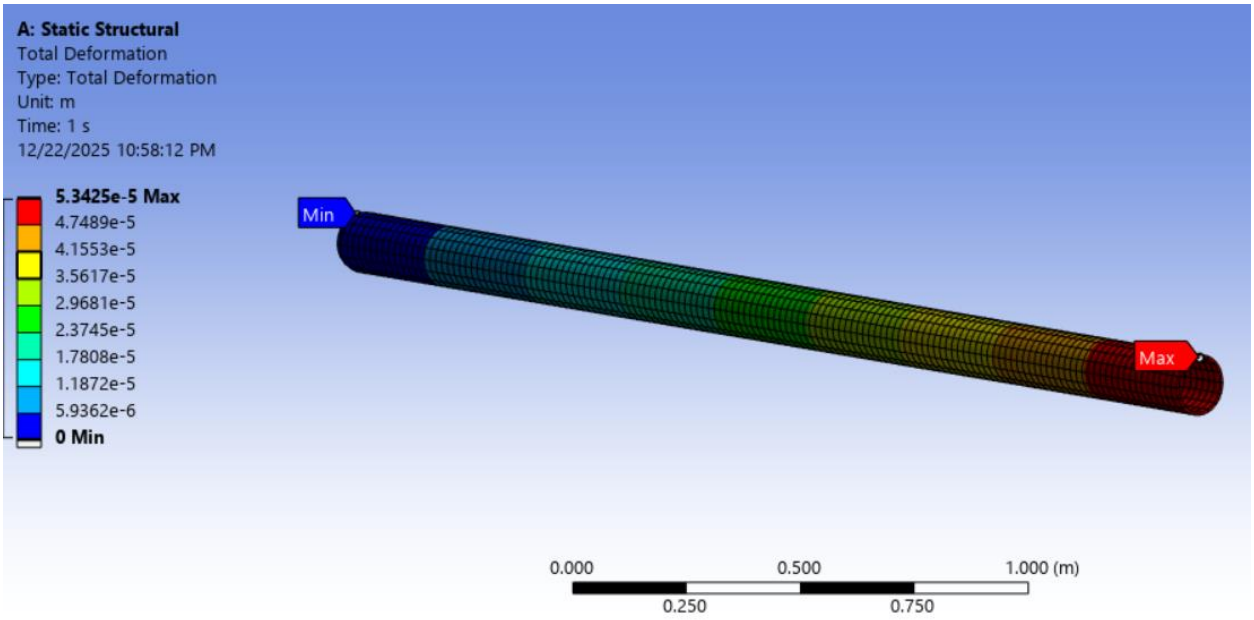
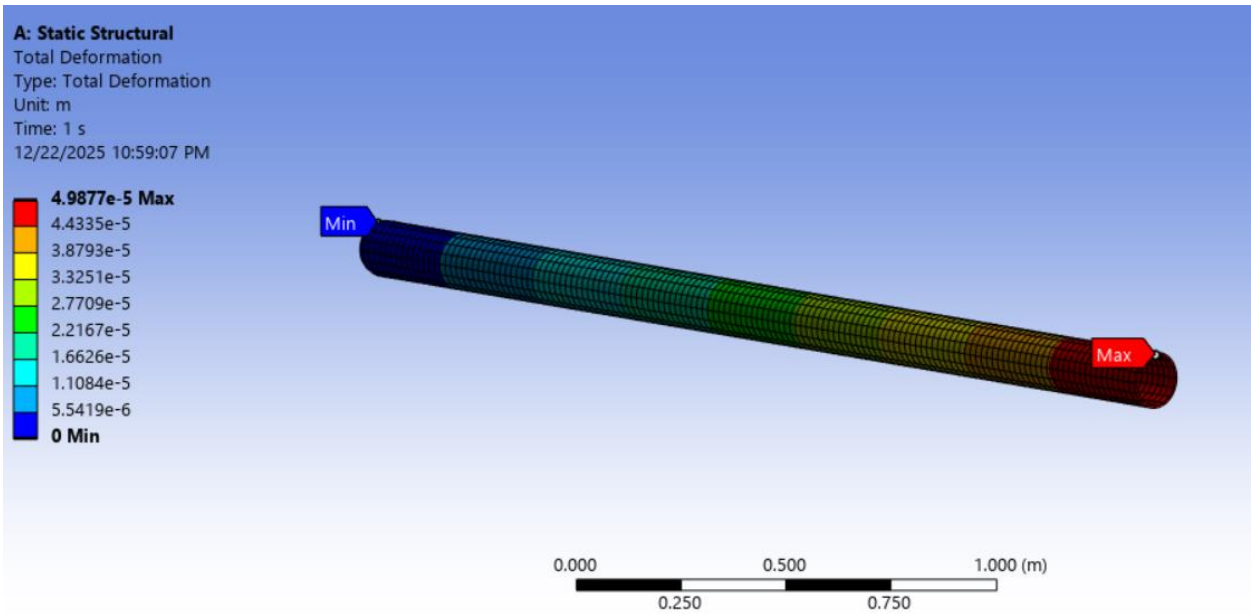


Mesh:



Results:

Stainless Steel:



Structural Steel: