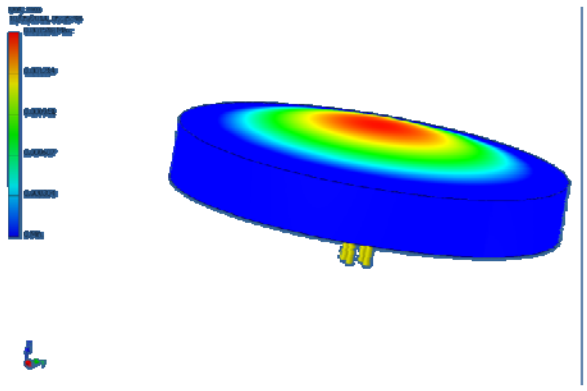
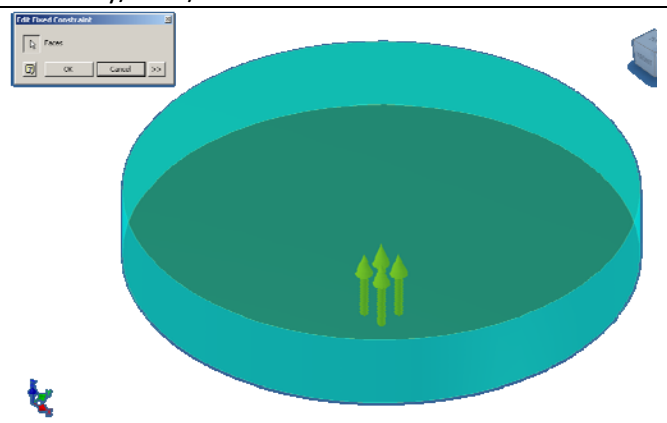
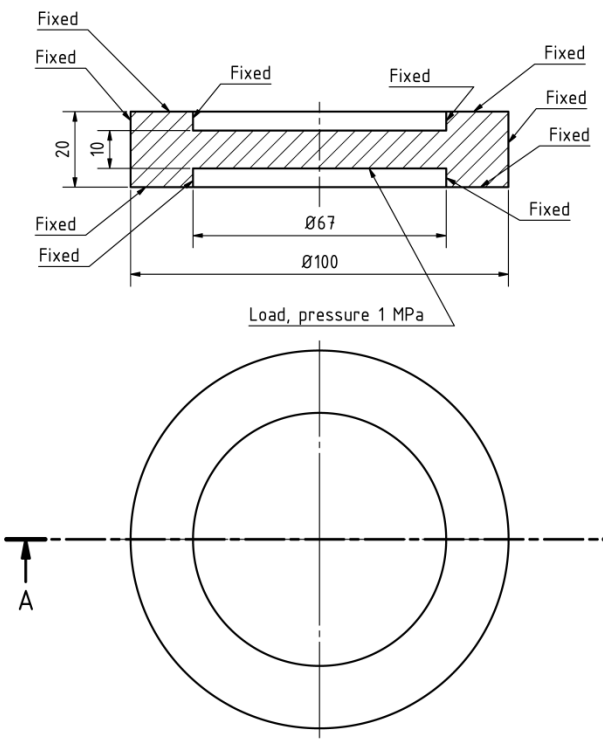
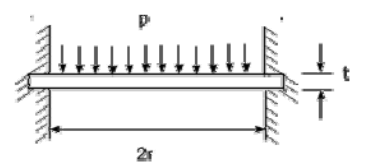
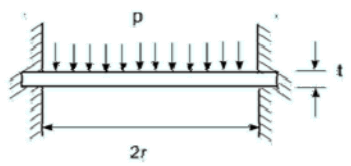
	Method/Result	Geometry/Load/Constrain
1 st case	Inventor FEA  Max displacement: 1.5 micron	 Material: Sapphire, E=345 GPa Diameter:67 mm, thickness: 10 mm. Constrain: fixed on the curved surface. Load: bottom circular surface, 1 MPa.
2nd case	Inventor FEA, with extra constrains simulating clamped edges Max displacement: 0.95 micron	 Material: Sapphire , E=345 GPa Constrain: fixed on the curved surface. Load: bottom circular surface, 1 MPa.
3rd case	Excel (hand) calculation  $\sigma_m = \frac{3pr^2}{4t^2}$ At Edges $y_m = \frac{pr^4}{64D} = \frac{0,171\,pr^4}{Et^3}$ At centre Max displacement: 0.62 micron	 Material: Sapphire, 67x10, E=345 GPa Diameter:67 mm, thickness: 10 mm. Constrain: fixed on the curved surface. Load: bottom circular surface, 1 MPa

Simple loaded circular plate supported by clamped edges

Dear All,

I'd grateful if someone can enlighten me regarding my confusing results using Inventor FEA. I'm trying to estimate the displacement of a flat' loaded, circular plate. I have three cases giving significantly different results when I expected very similar outcomes...What am I doing wrong? Is the FEA not set up correctly? (The hand calculations have been checked and I got the same result from an online calculator as well)

1st is the FEA on the plate, constrain on the curved surface (see details in .pdf).

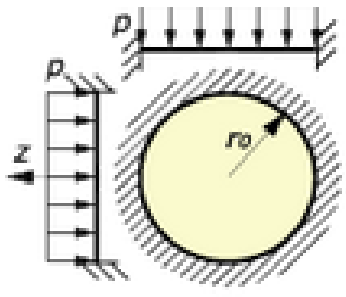
2nd case is trying to simulate the clamped edges better (see details in .pdf).

3rd method is good old classical statics.

Thanks for spending time on my problem,

Alexis

Efunda online calculator



67x10, E=345 GPa

Max displacement: 0.62 micron