The Hashemite University
Faculty Of Engineering
Mechanical Engineering Department

Thin Wall Cylinder

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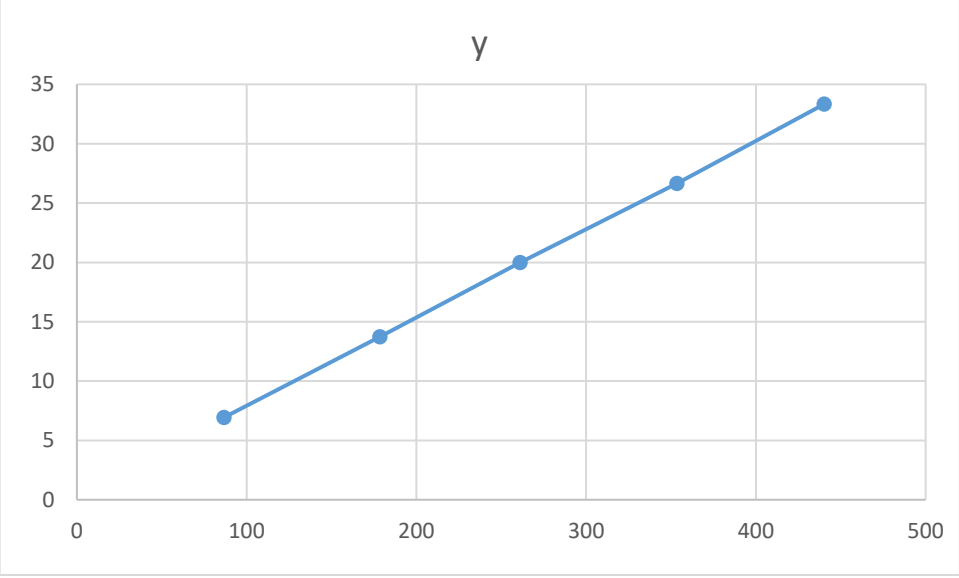
Results and Analysis:

- Fill the experiment results for all parts and compare with theoretical value:

Trial No. #	Cylinder Pressure P (Mpa)	Hoop Strain ε_H Gauge 1	Hoop Strain ε_H Gauge 6	Average Hoop Strain ε_H	Hoop stress σ_H (Mpa)
1	0.52	76.65	96.56	86.60	6.93
2	1.03	162.2	194.8	178.5	13.73
3	1.5	243.2	278.9	261.05	20.0
4	2	334.3	372.7	353.5	26.66
5	2.5	421.2	459.2	440.2	33.33
d = 80 mm t = 3.00 mm L = 358mm Theoretical modulus of elasticity (E) =69 Gpa					

- Plot σ_{Hoop} versus ϵ_{Hoop} then find E and compare with theoretical values.

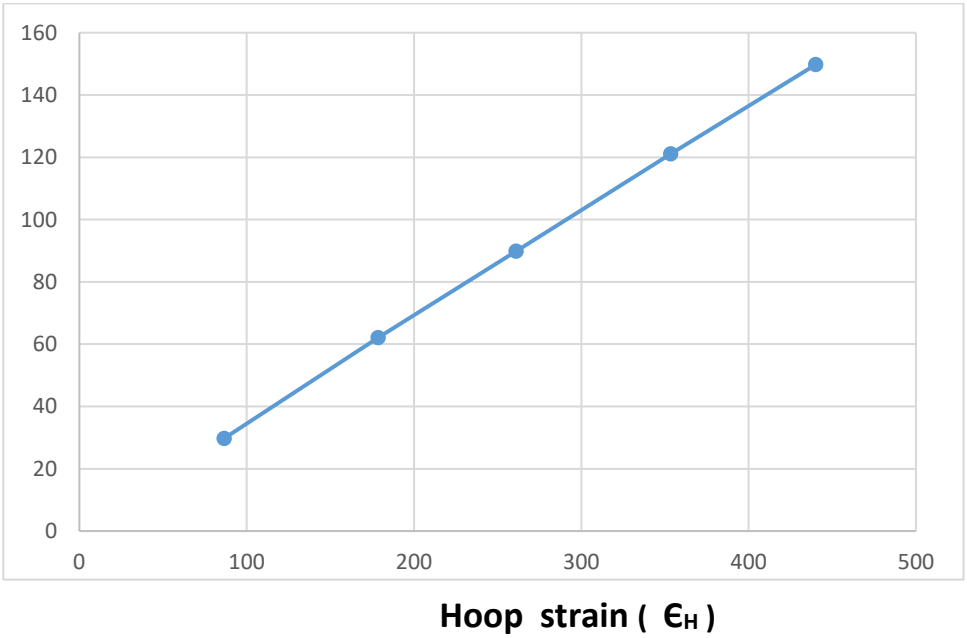


** Sample of calculation: slope = Eexp ,,,, slope = y2-y1/x2-x1
We will take the point (178.5 , 13.73) (353.5 , 26.66)
Slope = 26.66-13.73/353.5-178.5 = **73.8 Gpa** = Eexp
Now we can find the percentage error by : theo-exp /theo *100%
69Gpa -73.8Gpa /69Gpa =6.95%

- Fill table below and find the Poisson's ratio (ν):

Trial No. #	Hoop Strain ε_H Gauge 1	Hoop Strain ε_H Gauge 6	Longitudinal strain ε_L Gauge 2	Average Hoop Strain ε_H
1	76.65	96.56	-29.77	86.60
2	162.2	194.8	-62.14	178.5
3	243.2	278.9	-89.86	261.05
4	334.3	372.7	-121.1	353.5
5	421.2	459.2	-149.8	440.2
Theoretical Poisson's ratio (ν) =0.33				

- Plot ϵ_{Hoop} versus $\epsilon_{Longitudinal}$, then find Poisson's ratio (ν) and compare with theoretical value.



Slope = v = y2-y1/x2-x1

We will take the point (86.60 , 29.77) (440.2 , 149.8)

149.8-29.77/440.2-86.60 = **0.33** the the **error** is equal **zero %**

** Calculate the theoretical principal hoop and longitudinal strains for poisson`s experiment and compare your results with the experimental values?? (first trial only)

Answer : for **hoop strain** by applying the relation ;
strain hoop = stress hoop –v*stress long /E
(6.93 *10^6 –(0.33*0.5*6.93*10^6))/69*10^9 = 83.86 *10^-6 (theo)
For **longitudinal strain** = stress long –v*hoop stress /E
(0.5*6.93*10^6-(0.33*6.93*10^6))/69*10^9 = 17.07*10^-6 (theo)

- Calculate the theoretical longitudinal stress ?

Longitudinal stress =0.5* stress hoop (theo) = 0.5*6.93*10^6= **3.465 Mpa** for first trial .