

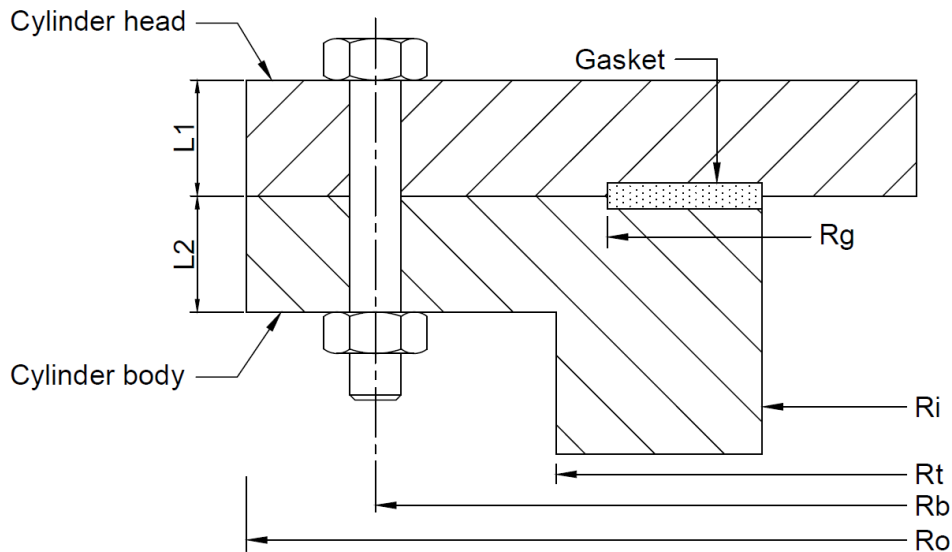
ME 307 MACHINE ELEMENTS I

PROJECT TUTORIAL-II

BOLTED JOINTS

The figure illustrates a pressure cylinder tightened by using certain number of bolts. Pressure inside is changing between its minimum and maximum value. A gasket is used to improve sealing capacity of the bolt. In your project,

- Determine the size, the type (grade) and number of bolts and proper preload to be assigned to the bolts by considering both;
 - Static failure ($P=P_{max}$) and,
 - Fatigue failure (P is fluctuating between P_{min} and P_{max}).



Specifications	1	2	3	4
A Material of the cylinder head	Al 1050 (HX9)	Al 6060 (T6)	AISI 303 Steel	AISI 304 Steel
B Material of the cylinder body	Al 1050 (HX9)	Al 6060 (T6)	AISI 303 Steel	AISI 304 Steel
C $P_{min} - P_{max}$ (MPa)	2-14	2-16	4-14	4-16
D Gasket Material	rubber	cork	Compressed asbestos	Copper asbestos
E Gasket Thickness (mm)	2	2.5	3	3.2
F Load factor of safety for bolts	1.2	1.3	1.4	1.5
G Strength factor of safety for bolts	1.2	1.3	1.4	1.5
H Life requirement (cycle)	infinite	250000	350000	500000
J Reliability (%)	50	90	99	99.9
K L1 (mm)	14	20	22	24
L L2 (mm)	16	18	22	26
M Ri (mm)	60	70	75	80
N Rg (mm)	Ri+6	Ri+8	Ri+10	Rg=Ro
O Ro (mm)	200	205	210	215
P Thread type	Rolled	Cut	Fillet	
Q Rb	140 mm			