

Name

Page 7

Assignment

uzair ichan

ID

13909

Programme

B-Tech (E)

Subject

Power System
Analysis

Submitted

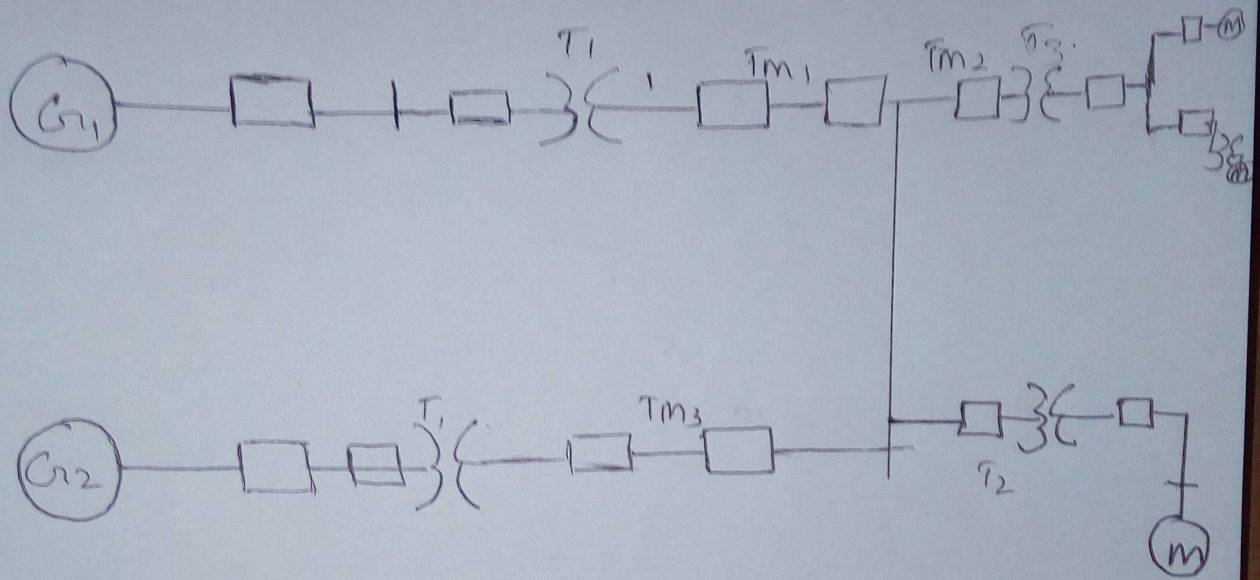
To. Engr. muhammael
Aamir Aman .

Name = Uzair Khan

Page (2)

ID = 13909

Q7) prepare an Impedance diagram and Reactance diagram from the single line diagram.

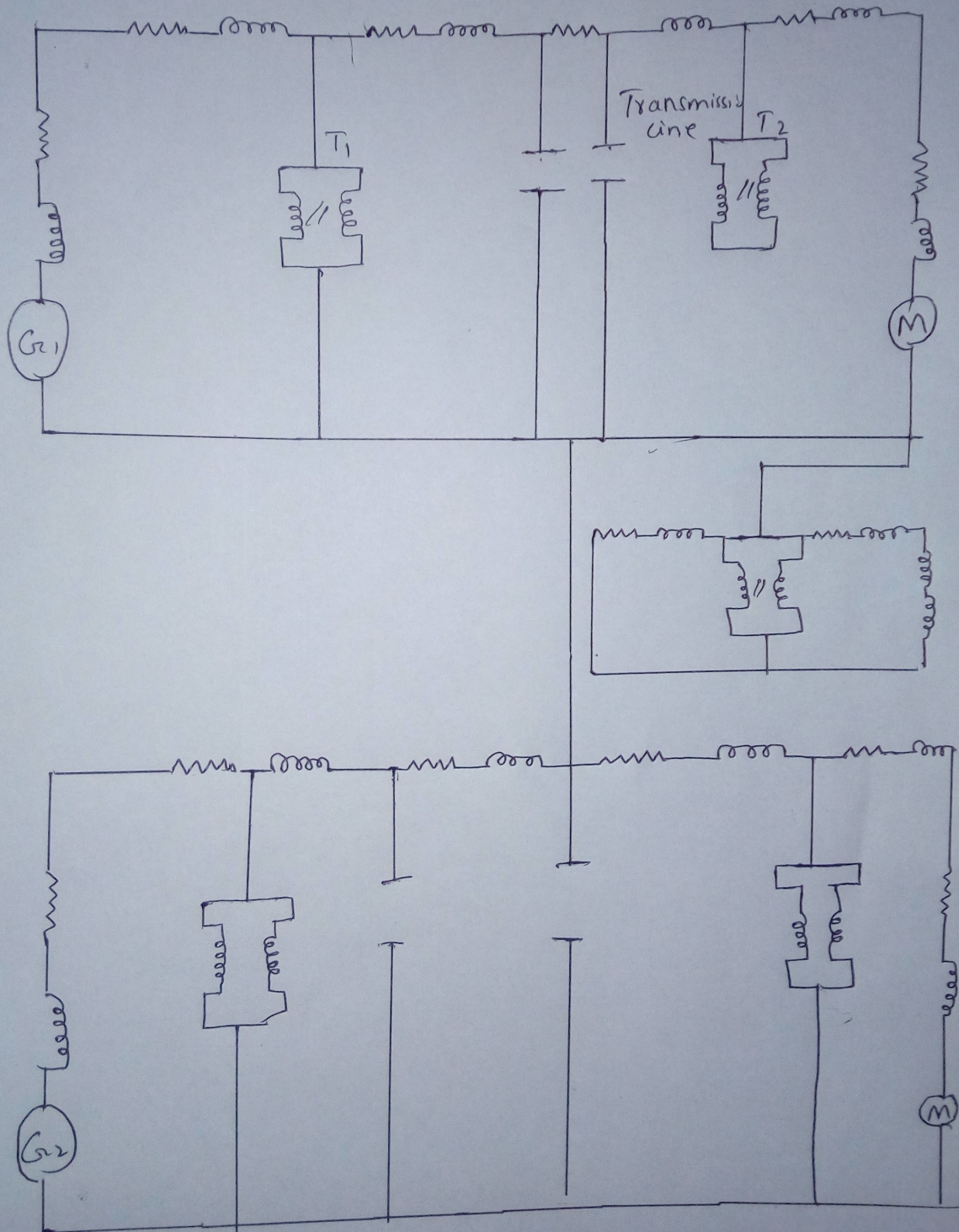


Name = Suzair Ichan

Page 3 D

ID = 13909

Im convert into Impedance diagram

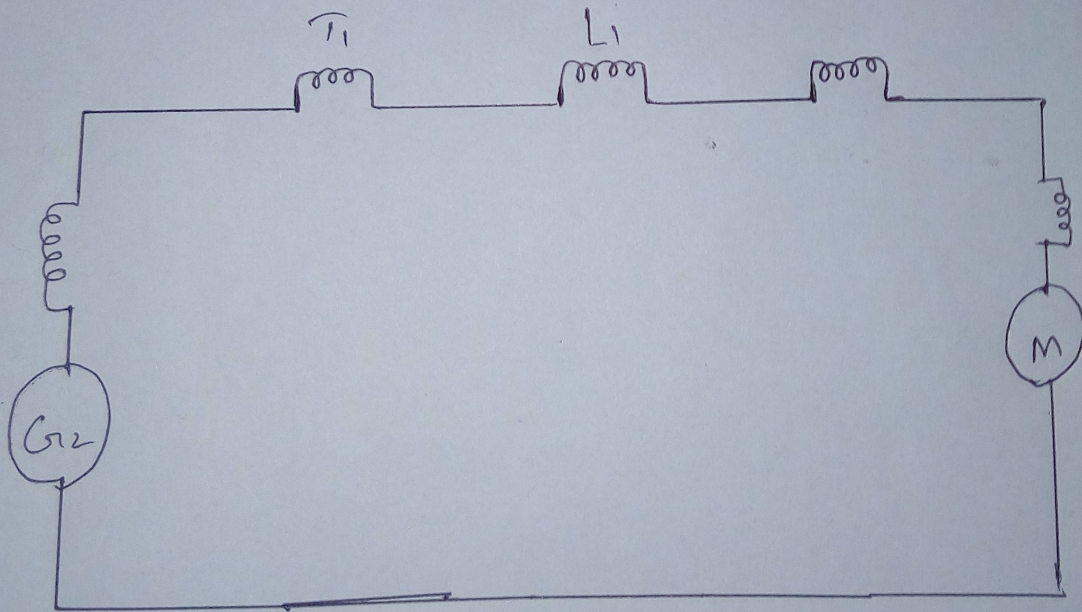
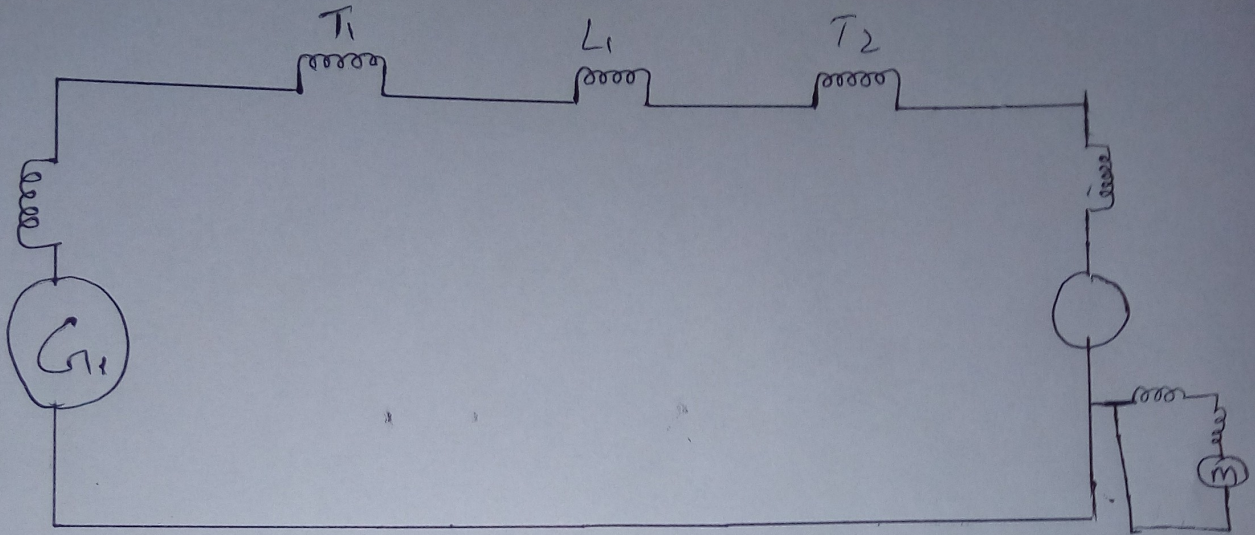


Name = Waair Ichan

Page (4)

ID = 13909

convert into Reactance diagram



Question (2)

→ // // //

$$\begin{aligned} \text{Solution} \Rightarrow V_{p.u} &= 2 \text{ p.u} \times I_{p.u} \\ &= 64 \times 350 = 2240 \end{aligned}$$

$$\begin{aligned} S_{p.u} &= V \times I \\ &= 22 \times 350 \\ S &= 7700 \end{aligned}$$

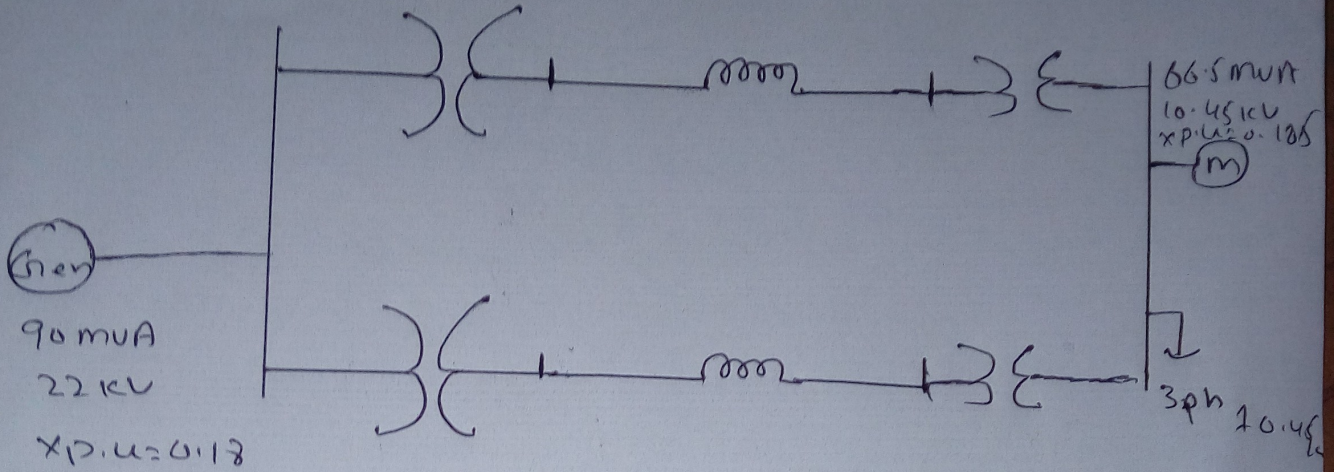
$$Z_{p.u} = \frac{V_{base}^2}{S_{base}}$$

$$= \frac{(22)^2}{7700}$$

$$\frac{484}{7700}$$

$$\boxed{0.0628} \text{ Ans.}$$

Q3) Find per unit impedance for following figure



- T_1 50 MVA 22/220 kV $x_{p.u.} = 0.70$
 T_2 40 MVA 22/1170 kV $x_{p.u.} = 0.06$
 T_3 40 MVA 22/1170 kV $x_{p.u.} = 0.064$
 T_4 40 MVA 1170/11 kV $x_{p.u.} = 0.08$
 Line 1: 48.4 ohm (Total)
 Line 2: 85.43 ohm (Total)

Abrube 57 MVA

20.6 pf (lag)

Calculation

$$Z_{base} = \frac{1000 \text{ base}^2}{Z_{base \text{ MVA}}}$$

For T. Line 1 $Z_{base} = \left(\frac{220}{100} \right)^2 = 484 \text{ ohm}$

For T. Line 2 $Z_{base} = \left(\frac{770}{100} \right)^2 = 1210 \text{ ohm}$

For 3. ~~0~~ Load $Z_{base} = \frac{(110)^2}{100} = 121 \text{ ohm}$

$$Z_{p.u} = \frac{Z_{actual}}{Z_{base}}$$

$$Z_{p.u} = Z_{p.u \text{ old}} \left(\frac{S_{base \text{ new}}}{S_{base \text{ old}}} \right) \left(\frac{V_{base \text{ old}}}{V_{base \text{ new}}} \right)^2$$

Name = Uzair Ichan

Page (8)

ID = 13909

For T-Line 1 using $X_{L1} \text{ p.u.} = \frac{48 \cdot 4}{484} = 0.7 \text{ p.u.}$

For T-Line 2 Using (2) $X_{L2} \text{ p.u.} = \frac{65 \cdot 43}{131} = 0.5 \text{ p.u.}$

For 3 phase load

Power factor $\cos^{-1}(\cos) = \angle 53.13$

Thus $S_{3\phi} \text{ (Load)} = 57 \angle 53.13$

$$Z_{\text{act}} \left(\frac{V_{\text{rated}}}{S} \right)^2 = \frac{10 \cdot 45^2}{57 \angle 53.13}$$

$$\Rightarrow 7.1415 + j 7.53267 \text{ ohm}$$

$$7.1495 + j 7.5326$$

1.21

$$0.95 + j 1.2667 \text{ p.u.}$$

For generator the new per unit reactance equation

$$X_{s.g} = 0.18 \left(\frac{180}{90} \right) \left(\frac{22}{22} \right)^2$$

$$= 0.2 \text{ p.u.}$$

For T/F $T_1: X_{L1} = 0.2 \left(\frac{180}{90} \right) \left(\frac{22}{22} \right)^2 = 0.2 \text{ p.u.}$

For T/F $T_2: X_{L2} = 0.06 \left(\frac{180}{90} \right) \left(\frac{220}{220} \right)^2 = 0.15 \text{ p.u.}$

For T/F $T_3: X_{L3} = 0.064 \left(\frac{180}{40} \right) \left(\frac{220}{220} \right)^2 = 0.16 \text{ p.u.}$

For T/F $T_4: X_{L4} = 0.08 \left(\frac{180}{40} \right) \left(\frac{770}{770} \right)^2 = 0.2 \text{ p.u.}$

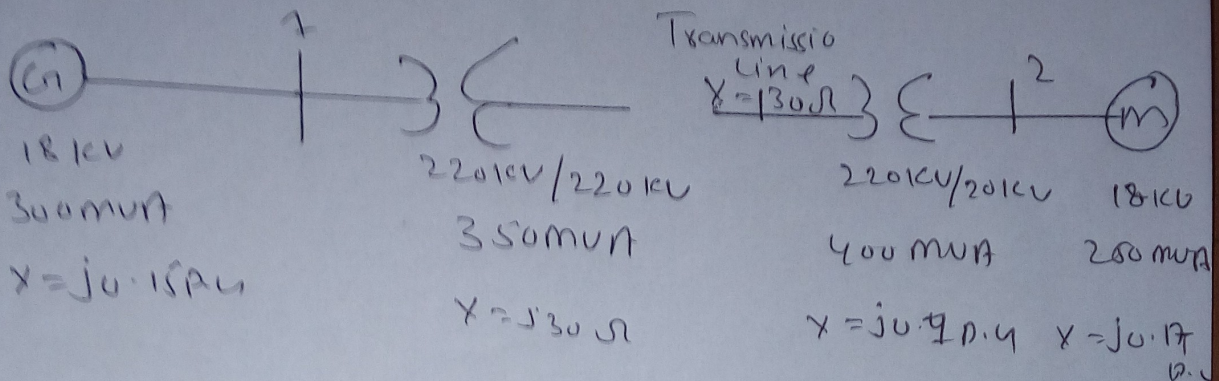
For motor $X_{sm} = 0.185 \left(\frac{180}{668} \right) \left(\frac{10.45}{11} \right)^2$

$$= 0.25 \text{ p.u.}$$

Name = Usair Khan

Page (10) - ID = 13909

Q15)



Solution \Rightarrow Pre fault

$$V_0 = \frac{17.2 \text{ kV}}{12.66} = 0.140$$

Reactance & apparent voltage are given
in base 200 MVA

Load = 200 MVA, 0.80 Power Factor
Leading.

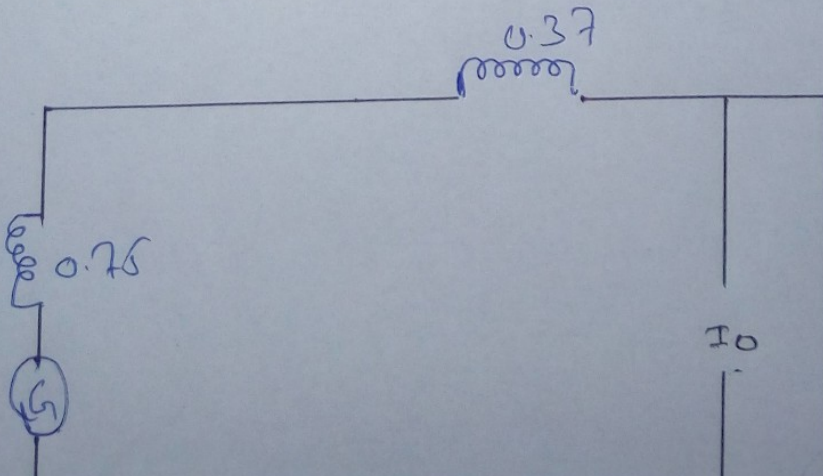
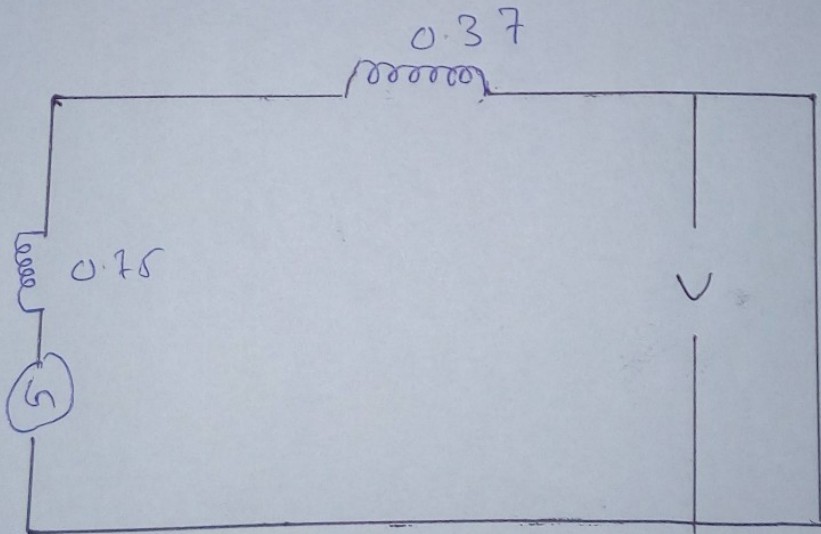
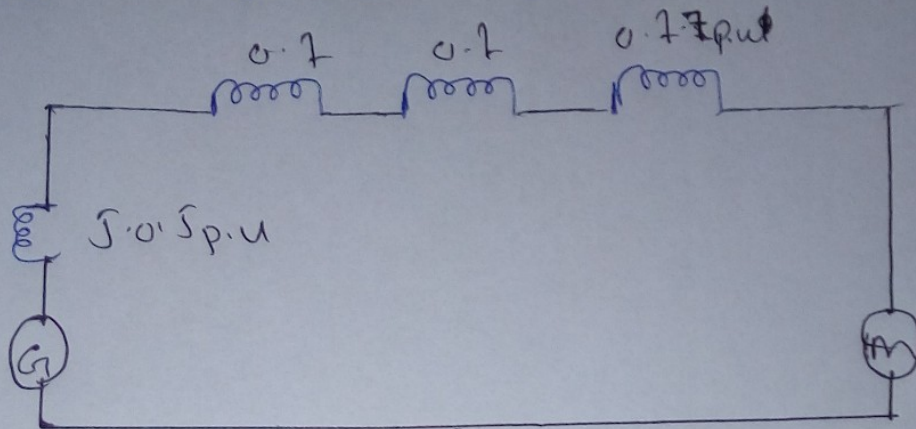
$$\frac{200}{10} = 20 \text{ p.u.}$$

Pre fault current

$$I_0 = \frac{10}{1.1 \text{ kV}}$$

$$\frac{10}{0.112} = \boxed{89.2857}$$

Pre fault equivalent circuit



Q0 = (6)

Ans) over current protective device must operate to isolate short

Circuit fault safety minimize

damage to circuit element and

avoid if possible. Shut down of

plant An accurate knowledge

fault current through out the

system is essential for the

correct application of protective device

and the design busbar and

terminal arrangement to with stand

conventional mechanical & thermal stress.

Q = (6)

Ans → over current protective device must operate to isolate short circuit fault safely minimize damage to circuit element and avoid if possible. Shut down of plant. An accurate knowledge of fault current through out the system is essential for the correct application of protective device and the design busbar and terminal arrangement to withstand conventional mechanical & thermal stress.