

Paper 3C2/P4B MATERIALS PROCESS MODELLING AND
FAILURE ANALYSIS

Thursday 1 May 2003

Numerical Solutions

3. (b) $\alpha_{\min} = \pi/4$

(c) $F = 12 \text{ MN/m}$

(d) $T = 370^\circ\text{C}$

$$T_p - T_0 = \frac{\frac{AQ/\pi r_B^2}{\sqrt{\pi} \lambda} \frac{\sqrt{2}}{\sqrt{v^*}} r_B}{1 + \frac{\sqrt{\pi}}{2} z \frac{\sqrt{v^*}}{\sqrt{2} r_B}}$$

4. (b)

$$\frac{(q^*)_z}{(q^*)_{z=0}} = \left(1 + \sqrt{\frac{\pi}{8}} z^* \sqrt{v^*}\right) = \frac{(T_p - T_0)_{z=0}}{(T_p - T_0)_z}$$

(c) $z^* = 8.94 \times 10^{-4}$

$z_{\max} = 1.79 \mu\text{m}$

$T_p = 258^\circ\text{C}$

(d) $T_p \spadesuit 79^\circ\text{C}$