p7-21

Equations

Problem 7-21

We refer to the Figure 7-13. We fit the following data read off the plot...

$$x_1 = 4 \tag{1}$$

$$y_1 = 80 \tag{2}$$

$$x_2 = 12 \tag{3}$$

$$y_2 = 180 \tag{4}$$

To the Hall-Petch Equation in the following two instances..

$$y_1 = \sigma_0 + k_y \cdot x_1 \tag{5}$$

$$y_2 = \sigma_0 + k_y \cdot x_2 \tag{6}$$

Which allows us to find the values of constants. Now assume that the grain diameter is on the average...

$$d = 0.001 \tag{7}$$

Then applying the equation...

$$\sigma_y = \sigma_0 + k_y \cdot d^{-1/2} \tag{8}$$

Which is off the chart.

Solution

$d = 0.001$	$k_y = 12.5$
$\sigma_0 = 30$	$\boxed{\sigma_y = 425}$
$x_1 = 4$	$x_2 = 12$
$y_1 = 80$	$y_2 = 180$