



IE-352  
 Section 1, CRN: 32997  
 Section 2, CRN: 5022  
 First Semester 1432-3 H (Fall-2011) – 4(4,1,1)  
 MANUFACTURING PROCESSES - 2

Monday, May 9, 2011 (6/6/1432H)

Exercise: Tool Life and Cutting Speed

Name:	Student Number: 42
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### Tool Life and Cutting Speed

Using the Taylor Equation for tool life and letting  $n = 0.5$  and  $C = 120$ , calculate the percentage increase in tool life when the cutting speed is reduced by 50%.

Given:

$$n = 0.5$$

$$C = 120$$

$$V_2 = 0.5V_1$$

Req:

%ge increase in tool life

$$\text{i.e. } \frac{T_2 - T_1}{T_1} = ?$$

Solution:

Taylor Equation for tool life:  $VT^n = C$

$$\text{i.e. } V_1 T_1^n = V_2 T_2^n$$

$$\text{substituting } n \Rightarrow V_1 T_1^{0.5} = V_2 T_2^{0.5}$$

$$\text{since } V_2 = 0.5V_1 \Rightarrow V_1 T_1^{0.5} = 0.5V_1 T_2^{0.5}$$

$$\Rightarrow T_1^{0.5} = 0.5(T_2^{0.5})$$

$$\Rightarrow \sqrt{\frac{T_2}{T_1}} = 2$$



$$\Rightarrow \frac{T_2}{T_1} = 4$$

$$\text{increase in tool life} = \frac{T_2 - T_1}{T_1} = \frac{T_2}{T_1} - 1 = 4 - 1 = 3$$

i.e. tool life increased 3-fold (i.e. 3 times)

**$\Rightarrow$  increase in tool life is 300%**

Note, a decrease in cutting speed by 50%, resulted in a 300% increase in tool life!

Also note, value of C was irrelevant here (redundant information).