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

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

i.e. $\frac{T2-T1}{T1}$ =?

Solution:

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

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

substituting n ⇒ $V_1{T_1}^{0.5} = V_2{T_2}^{0.5}$

since $V_2 = 0.5V_1$ ⇒ $V_1{T_1}^{0.5} = 0.5V_1{T_2}^{0.5}$

⇒ ${T_1}^{0.5} = 0.5({T_2}^{0.5})$

⇒ $\sqrt{\frac{T_2}{T_1}} = 2$

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

increase in tool life = $\frac{T2-T1}{T1} = \frac{T2}{T1} - 1 = 4 - 1 = 3$

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

⇒ 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).