Quiz 6c

Note Title 31/05/2011

Using an electric drill to make a pilot hole in a 2×4 requires 85 W of power. A certain drill has a 12 V battery and an armature resistance of 0.80 Ω.

a.) How much back EMF is generated while drilling the pilot hole?

b.) If the drill gets jammed (cannot rotate) and the user holds down the trigger it is possible for the motor burn out (damaged by heat). Explain why this happens. (2 points)

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a.) How much back EMF is generated while drilling the pilot hole?

$P = I^2 r$

$I = \sqrt{\frac{P}{r}} = \sqrt{\frac{85\,W}{0.80\,\Omega}}$

$= 10.3\ A$

$V_{Back} = \mathcal{E} - Ir$

$= 12V - (10.3A)(0.80\,\Omega)$

$= 3.8\ V$

b.) If the drill gets jammed (cannot rotate) and the user holds down the trigger it is possible for the motor burn out (damaged by heat). Explain why this happens. (2 points)

- If the motor cannot turn [redacted] is generated
- No back EMF means [redacted] flows
- More current means more heat generated by internal resistance.