

Re: DC Motors

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- *From:* Don Foreman <dforeman@xxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Tue, 29 May 2007 16:49:18 -0500
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On Mon, 28 May 2007 18:08:57 -0500, "Jon Slaughter"
<Jon_Slaughter@xxxxxxxxxxx> wrote:

"Rich Grise" <rich@xxxxxxxxxxx> wrote in message
<news:pan.2007.05.28.22.56.03.213552@xxxxxxxxxxxxxxxx>

On Sun, 27 May 2007 18:52:19 -0500, Jon Slaughter wrote:

Does anyone know what kinda motors that most drills use? I
was thinking
it
was a torque motor but not sure.

Also, for DC motors can I get away with changing the
voltage to a lower
setting to increase the torque or do I run a huge risk of
burning up the
motor?(i.e., are they usually designed for a very narrow
operating
voltage).

I have this old broken 18v drill and I want to turn it into
opening a
gate.

I figure that it has enough torque to do it and I can control
the speed
quite easily.

If you already have speed control, don't mess with the voltage. What's
broken about the 18V drill? Right after saying it's broken, you say it has
torque and speed control.

Run it at 18 V and either figure out a trigger setting, or hack the
controller to do with what you want.

Re: DC Motors

Its broken at the shaft. The motor seems to run fine but overall the drill is broken (you know, there are other parts to a drill). The speed control is through the trigger and I need to automate it... The "control" is encapsulated so not much I can do with it. I didn't say it had speed control though... I said I can control the speed quite easily (by supplying a lower voltage).

Since it runs on dc either I can use some dc method of power control such as pwm or AC method such as triacs and rectification (both of which probably result in essentially the same result). But seems to me using dc and just lowering the voltage is the easiest thing? I really don't understand what the point of pwm is as it would ultimately seem to still average out things to an equivalent voltage supply? (i.e., why not just lower the voltage in the first place if I can do that (remember, I don't need to automate the speed of the motor but just easily be able to find the right speed which makes the gate open fast enough).

i.e. the issue is not to automate the speed of the drill but to know how the torque and speed are related to the current and voltage so that when I guesstimate the right settings needed for the drill to run properly.

For permanent magnet motors:

No-load speed is proportional to voltage.

Torque is always proportional to current.

Under load, the EMF that the armature sees is reduced by the IR drop in the armature winding and speed will then be proportional to this reduced EMF.

The amount of current that the motor can draw is also related to speed, because a counter EMF proportional to speed is induced in the armature. The current is then the (applied voltage - EMF) / armature_resistance. So, at stall the current is V/R (V being applied voltage), torque is maximum (stall torque) and speed (hence EMF) is zero by definition.

Maximum power is produced at 1/2 speed, because that's where the speed * torque product (and EMF * current product) is greatest. Some motors can't tolerate this much current without overheating, others can handle stall current indefinitely.

Some drills use series-wound motors, in which a wound field is in series with the armature. Most corded drills are made this way. Behavior of these motors is more complicated. However, most cordless drills use permanent-magnet motors.