I am not sure if this applies here. In the HMV competitions we have found that it is good if you can change gearing i.e. gear ratios for different tracks. Is this also true for the Electrathon vehicles? If so how are the gearing changes accomplished?

gear changes are accomplished, generally by changing the motor sprocket. The big sprocket on the wheel is to hard to change & a difference of 2 or 3 teeth on it won' t make as great a difference as 2 or 3 teeth on the motor sprocket. We generally have 6 or 8 different motor spare sprockets. Small changes & you may not have to change chain length but a large number of teeth difference in your new sprocket & you may need to change chain length. Keep in mind that you want the motor to run wide open all the time, electric motors use the least amount of electricity at that speed. If 30 mph is where you'll run most of the time gear for that speed. If you are using an etek motor they run about 1720 rpm. I'm not sure about the etek replacement, maybe 1728 rpm. Scott 1hp maybe 3200. Count the teeth on both sprockets. Measure the circumference of the drive wheel. These are the things you need to know to figure ground speed. Also it is good to know how hilly the track is & wind speed. How cold is it? You may want to warm the batteries.

When you state that electric motors use the least amount of electricity at that (wide open) speed, that must mean that it provides the most amount of work for energy input. Since electric motors seem to have a nearly flat torque curve, where does the efficiency come from? I suspect it is from less heat loss through the speed regulation device, is this true?

You can do gear changes a few ways:

1. Use a multi-speed planetary rear hub. These can be purchased from 3 speeds up to 21 speeds. Driver MUST not abuse the hub! (NO BURN OUTS)

2. Two-speed mechanical jackshaft. Do not use the centrifugal style. The RPM output of the electric motor at 24 volts does not allow the centrifugal clutch to engage properly, even with lightened springs.

3. Use a relatively large sprocket on your rear tire/axle and then just change the motor sprocket.

For a new team, stick with option 3.

In the "real world", gear for the hills at RA and for a constant 40 amp load at WIR. Switch to a numerically higher gear set for the slalom and braking tests.

To make it REALLY simple, install a 60 tooth gear on the rear tire/axle. If you're running an Etek or Etek clone, you can get gear ratios down to 5.45:1 with that sized sprocket. That's enough to smoke the tires all day long.

Another hint, install a spring loaded idler sprocket. This way the students and change the motor sprocket without having to move either the motor or the rear tire. It also keeps the chain at the proper tension.

When you are accelerating watch your amp gauge, it may be reading 60/70 amps, when you reach wide open speed the amp gauge should read in the 30/40 range if your car is aerodynamic & not terribly overweight. Efficiency, you answered your own question, lots of electricity to get up to speed, very little to keep it there. Heat is the enemy, you want to get rid of all you can That's why people burned up the Scott motors. It is a high speed motor, lots of heat generated. Etek runs much slower, I don't know of anyone that has heat problems with it. Here's a trick I forgot to include in my previous entry, if you have 2 cars with the same motors & same circumference drive wheel, use 2 different size drive sprockets, example 52 tooth & 60 tooth, that way you don't

need as many spare motor sprockets because the 2 cars can use different size motor sprockets to get the same speed.

What kind of gear ratios are you guys running for RA?

Last year, Watertown was running at around 8 to 1 :) We mis-calculated the output of the Etek Motor's RPM Curve to be full output at 24volts, when it is really at 48 volts for full range. :) Needless to say we were pretty slow!!! Sorry I am no help other than do not run 8 to 1 in my eyes... LOTS OF TORQUE THOUGH...

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At Wisconsin Dells we ran a 1:2.6 (07WI) and a 1:3 (08WI). I wouldn't go any lower than 1:4 depending on how efficient your vehicles are and how much top secret battery juice you have.

About 1:2.5 for us w/ max efficiency at 900 rpm. We have two sprockets for the motor and two for the wheel that gives us a range of about 1:4 to 1:2. Depending on tests around our campus, which is fairly hilly, we'll make final decisions. Pick the speed that you want max efficiency and the rpm of your motor at max efficiency and calculate ratios off of those. This is how we went about deciding our ratios. This is the first time that we've dealt with this, so if it doesn't work for you I'll take no responsibility LOL. hope this helps a little. :)

Ryan