

The large number of data tables in Gearbox1.doc may be at first sight very confusing. But, if you follow through the sequence given below then you will be guided by the tables in the document in question.

Preamble:

The power developed by an electric motor to overcome and move the mass of a locomotive and its rolling stock -is transmitted through the gears to the output shaft and thence to the wheels in contact with the track. There must be sufficient friction between the track and the wheel to prevent wheel slip.

This is termed the Limiting Friction of the point of contact.

For a Steel to Brass interface this is 4.3:1 -or for 1 Kg of weight on the wheel 0.230 Kg of it can be used at the point of contact for motion. This means that the force at the wheel is rated at: 230 Grammes per Centimetre

Wheel slip will occur if the force is higher than this or the interface rating is lower than 3.5:1 (e.g. leaves, oil -etc).

In order to provide the correct ratio, extra adhesive mass should be added to the loco, or additional force provided by more than one axle.

Worked Example:

If we use the following as an example.

A 4-6-0 weighs 20Kg.

The weight on each of the axles is 2.5Kg, 2.5Kg, 5Kg, 5Kg, 5Kg.

The size of each driver wheel is 85mm.

I would like my locomotive to run at 50 MPH scale.

Torque at driving wheel must be: $5,000/4.3=1,162$ Grammes per Centimetre

RPM of axle with 85mm wheel at a scale 50mph is: 224 RPM

Looking at the data table for torque to wheel size you will see that, for an 85mm wheel, an RE-540/1 motor with a 30:1 reduction gear is a good fit. The reduction speed table for the motors shows that this combination has a maximum rotation of 445 RPM. The data sheet also shows that the motor will pull under 3 Amp -thus this combination is suitable for all the speed controllers listed.