

WP0328

Dodge® Quantis gear reducers: high ratio selection methods, torque vs hp selection

Dodge Customer/Order Engineering



Quantis has one trait that makes it unique to other Dodge gearing products. By installing a 1 or 2 stage ILH to the input of a 3 stage ILH, RHB, or MSM, Quantis can achieve 4 or 5 stage gear reductions and up to 7500:1 gear ratio. This is high ratio Quantis.

The most important factor of High Ratio Quantis selection is selecting based on output torque. Traditionally, gearing selection is made based on the horsepower of the motor. With lower ratios, this is a sufficient method for selecting a gearbox. But as you make a high ratio selection, the difference between a torque selection and a horsepower selection can result in a gearbox size difference of several sizes.

All applications using a gearbox have a required torque that the output of the gearbox must produce. Assume an application with a 10:1 gearbox and a torque requirement of 100 in-lbs. Divide the 100in-lbs by 10:1 and this gives us a required motor torque of 10 in-lbs. 10 in-lbs converts to .28 hp for a 1750 RPM motor. Based on this you would use at least a .33 hp motor. But what is important to understand is the motor will not pull the full .33 hp of the motor. The horsepower on the nameplate of the motor is the maximum horsepower the motor can pull. Unless the application has a torque requirement that pulls the full torque (horsepower) of the motor, the motor will only pull the necessary torque (horsepower) to run the application. This can be proven by analyzing the amp draw of the motor based on the torque requirement of the application, and comparing that amp reading to the full load amp reading.

You can choose to do a horsepower or a torque selecting for low ratio gearboxes, but the difference would be miniscule and would most likely result in the same size gearbox selection. But higher ratios multiply the difference between horsepower and torque selections. The two examples below will highlight this difference.

Example 1:

Application:

Output torque requirement: 3000 in-lbs

Motor: 3hp, 180TC, 1800 RPM.

Gearbox: ILH, foot mounted, 30:1

Using the configurator the horsepower and torque based selections are below.

HP: HB482CN56C / 31.77-A1-S-I-1.000

Torque: HB482CN56C / 31.77-A1-S-I-1.000

The selection is the same. The reason is because the horsepower that will be produced from a 30:1 gearbox and 3000 in-lbs is 2.77hp. The next size down Quantis cannot handle 2.77hp.

Let's look at a 1000:1 example with all other specs the same as Example 1.

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ABB Motors and Mechanical Inc.

6040 Ponders Court

Greenville, SC 29615

Phone: +1 864 284 5700

Email: DodgeEngineering@abb.com

Example 2:

Application:

Output torque requirement: 3000 in-lbs

Motor: 3hp, 180TC, 1800 RPM.

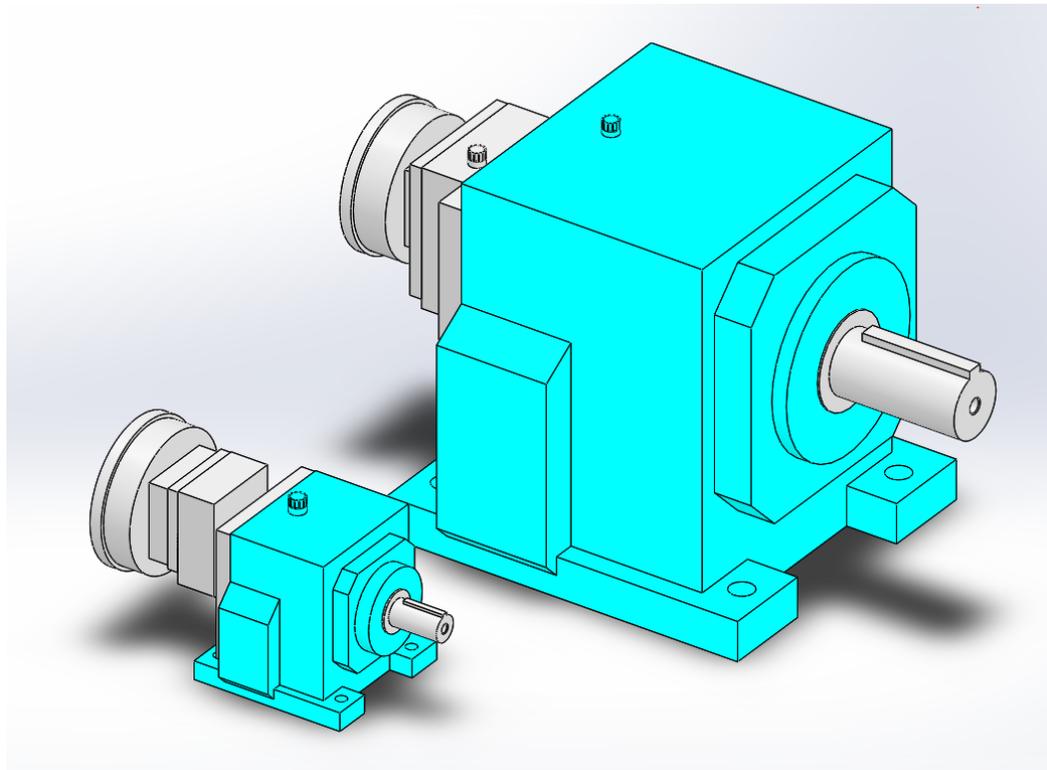
Gearbox: ILH, foot mounted, 1000:1

Using the configurator the horsepower and torque based selections are below.

HP: HB1684CN180TC / 1037.72-A1-S-I-4.000

Torque: HB684CN180TC / 1052.01-A1-S-I-1.625

The reducer on the left is the torque selected reducer, and the right side reducer is the horsepower selected reducer. The 168 is rated for a 3hp motor. The 68 is rated for .19 hp. But again, if the torque of the application is 3000 in-lbs and a 1000:1 reducer is used, only .08hp will be pulled from the motor. You can argue that a 3hp motor is massive overkill which can be found in certain applications. Theoretically, a .25 hp motor could be used which could help the customer with cost.



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