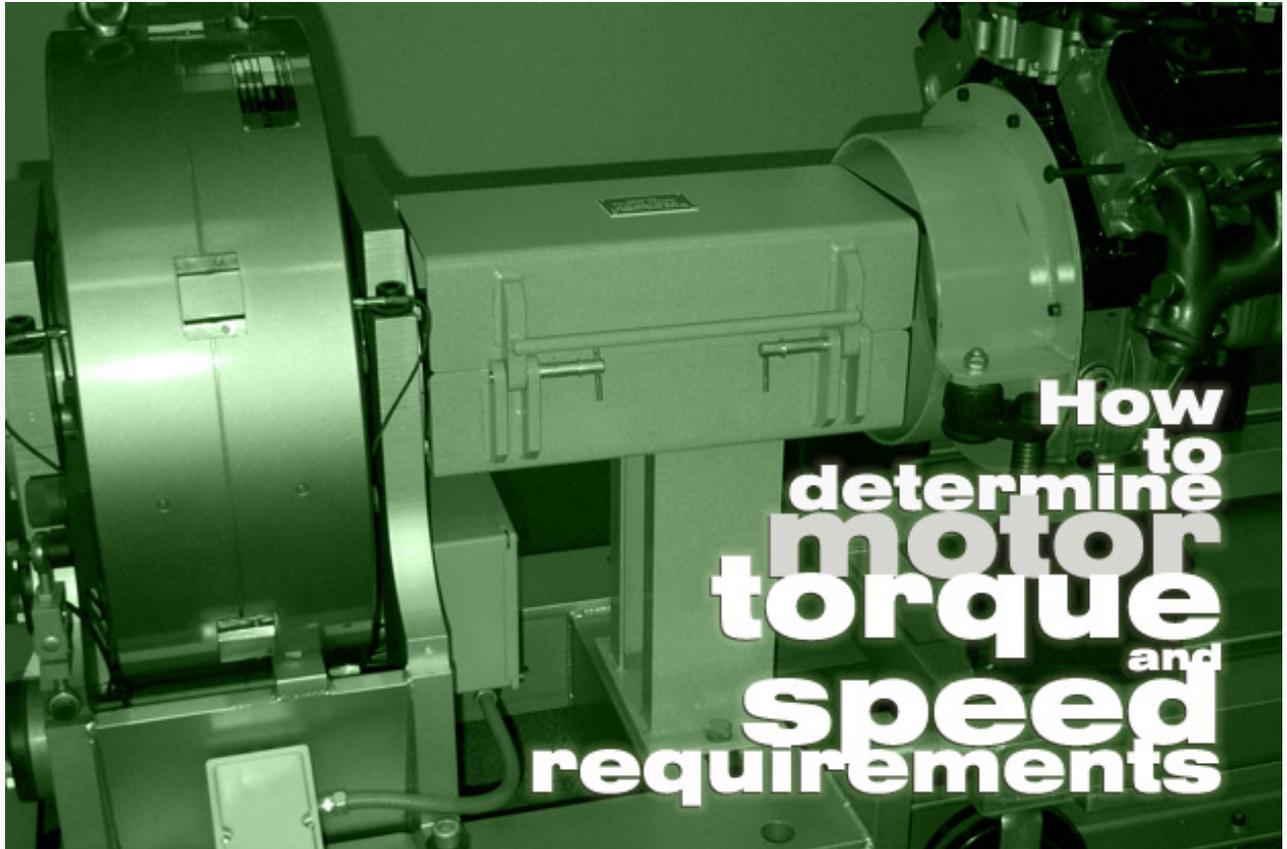


How to determine motor torque & speed requirements

by Edvard



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Operating Speed Range

The desired speed range may be difficult to achieve depending on the **type of application**. In general, depending on motor size and load type, very wide ranges may require a special motor.

Operation at very low speeds, requiring the **motor to run** at very low frequency (*below approximately 6 Hz*) or **very high speeds** requiring the motor to run at very high frequencies (*above 90 Hz*) **may require a special motor**.

Motor synchronous speed varies directly with the **control output frequency**. Therefore, the frequency required to achieve a desired application speed can be approximated by dividing the desired speed by the motor rated speed and then multiplying by the rated frequency of the motor.

If the minimum or maximum frequency are near or outside the limits mentioned above then the motor manufacturer should be consulted before proceeding.

Examples of speed ranges are listed below, expressed as a **ratio of the motor base speed to a minimum speed**.

Constant and Variable Torque Speed Range Examples

(Base speed = 2500 RPM)

Minimum Speed (RPM)	% Motor Base Speed	Speed Range Ratio
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1250	50	2:1
625	25	4:1
250	10	10:1
125	5	20:1
25	1	100:1

Constant horsepower applications have a speed range where the base speed is the lowest speed not the top speed.

Constant Horsepower Speed Range Examples

(Base speed = 2500 RPM)

Minimum Speed (RPM)	% Motor Base Speed	Speed Range Ratio
3750	150	1.5:1
5000	200	2:1
7500	300	3:1

Note: These speed range examples are for illustration purposes only. Not all motors will be capable of operating within these ranges.

Breakaway Torque

The motor must have enough *breakaway torque* to start the load.

This is not related to the *motor locked rotor* or starting torque published for across-the-line starting. Breakaway torque is limited by the motor, the available current from the control, and by the setup of the control.

If the *static torque* required to start the load moving is above 140 percent of motor full-load torque, an oversized control and a motor with sufficient torque capability may be required.

There are several techniques that can be used to achieve the required torque, within the capability of the components used. These techniques should be discussed with the motor manufacturer to achieve the optimum configuration.

Resource: NEMA VSD Guide

Source:

<http://electrical-engineering-portal.com/how-to-determine-motor-torque-and-speed-requirements>