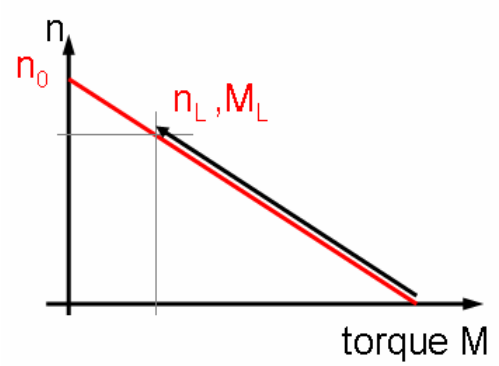
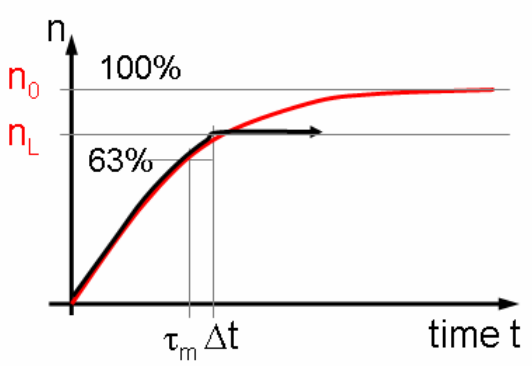
Motor acceleration

We have to distinguish between two basic types of acceleration. Acceleration at constant voltage and acceleration at constant current.

Acceleration at constant voltage

Acceleration at constant voltage means that the motor speeds up according to the speed-torque line at this voltage. At low speed the torque is high and the speed change rate is high. Due to the high torque the motor needs a lot of current. The faster the motor runs the higher the induced voltage and the lower the current flow. Accordingly less torque is produced and the acceleration rate is reduced.

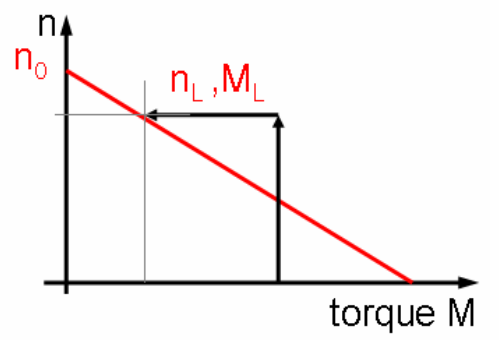


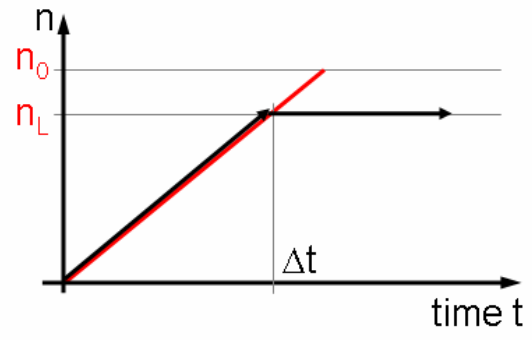


The motor speed as a function of time shows an exponential behavior with the mechanical time constant as the characteristic parameter. The mechanical time constant of the naked motor without load inertia is given in line 15 of the motor data. It spans from about 1 millisecond for the most dynamic motors up to about 50 ms and more for the less dynamic flat motors.

Acceleration at constant current

The second basic type of acceleration is at constant current.
Very often – and particularly for larger motors – the starting currents are very high and cannot be delivered by the power supply or the power stage of the controller. In such cases acceleration occurs at the maximum current that can be delivered. Constant current means constant torque. The speed changes linearly with time and can be calculated easily.





According to which acceleration regime we work in the acceleration duration is slightly different.