Drive Sizing - Motor Sizing

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project | Part/Position: no real part | Prepared by: Sample, not released

Required sizing quantities: motor speed 955 rpm, peak torque 12.68 Nm, RMS torque 6.02 Nm, peak power 1,268 W, reduced inertia 0.021 kg·m².

Note: the results are the required sizing quantities. The specific motor or servo selection is manufacturer-specific and is based on the torque-speed characteristic curve (continuous and peak torque over speed, field weakening, thermal limits, permissible inertia ratio).

Input and mechanics

Application	Linear axis
Moving mass m	200 kg
Coefficient of friction μ	0.1
Incline angle	0 deg
Output: wheel, effective diameter d	100 mm
Maximum velocity v	1 m/s
Gear ratio i	5
Efficiency η	0.9
Motor inertia J_M	0.001 kg·m²
Gearbox inertia J_G	0 kg·m²
Motion profile t_acc / t_const / t_dec	0.2 / 1 / 0.2 s

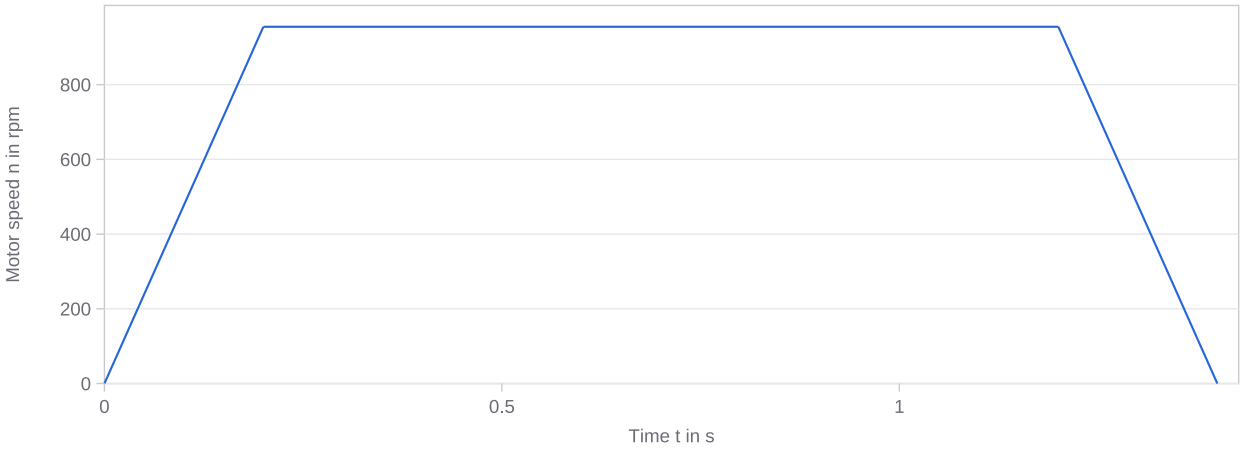
Sizing quantities

Motor speed n_mot	955 rpm
Peak torque M_mot (max. magnitude)	12.68 Nm
Motor torque, constant-speed phase	2.18 Nm
Motor torque, deceleration phase	−8.32 Nm
RMS torque M_mot,rms	6.02 Nm
Steady-state load torque (motor-referred)	2.18 Nm
Reduced inertia J_red	0.021 kg·m²
Motor angular acceleration α_mot	500 rad/s²
Peak power P_mot	1,268 W
Constant-speed power P_const	218 W
Feed constant K_VA	0.3142 m/U

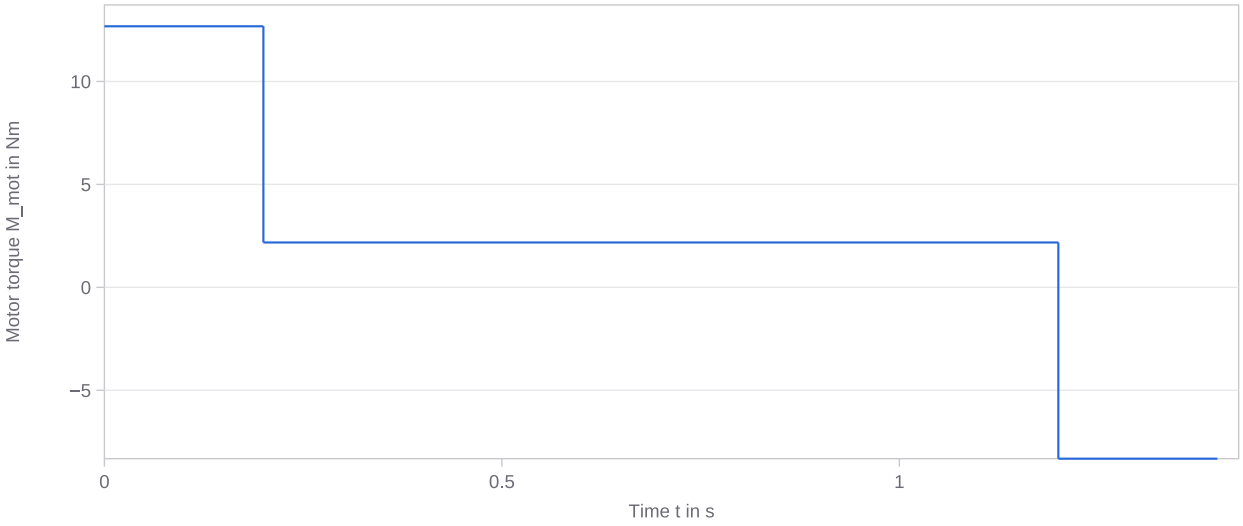
Assessment against motor limits

Criterion	Value	Limit	Status
Peak torque against M_allow	12.68 Nm	20 Nm	● OK
Motor speed against n_allow	955 rpm	3,000 rpm	● OK

Motion profile (trapezoidal) over the cycle



Motor torque over the cycle



Calculation basis

The trapezoidal motion profile gives the motor speed and angular acceleration via the output element (feed constant K_VA) and gear ratio i. The inertia reduced to the motor shaft is J_red = J_M + J_G + (J_L + m r²)/i². The motor torque per phase consists of the steady-state load torque M_L/(i η) and the acceleration torque J_red α; the RMS torque is the quadratic mean over the cycle, and the power is P = M·ω.

About this sample

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