

Ball Screw (Spindle)

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

Drive torque, critical speed, DN value, buckling load, life

Overall assessment: OK - operating speed, DN value, and buckling are all within the allowable range.

Inputs

Nominal diameter d0	25 mm
Lead P	10 mm
Core diameter d3	21 mm
Unsupported length L	800 mm
Bearing arrangement	fixed-supported
Axial force F	5,000 N
Efficiency η	0.9
Feed velocity v	0.5 m/s
Dynamic load rating Ca	30,000 N

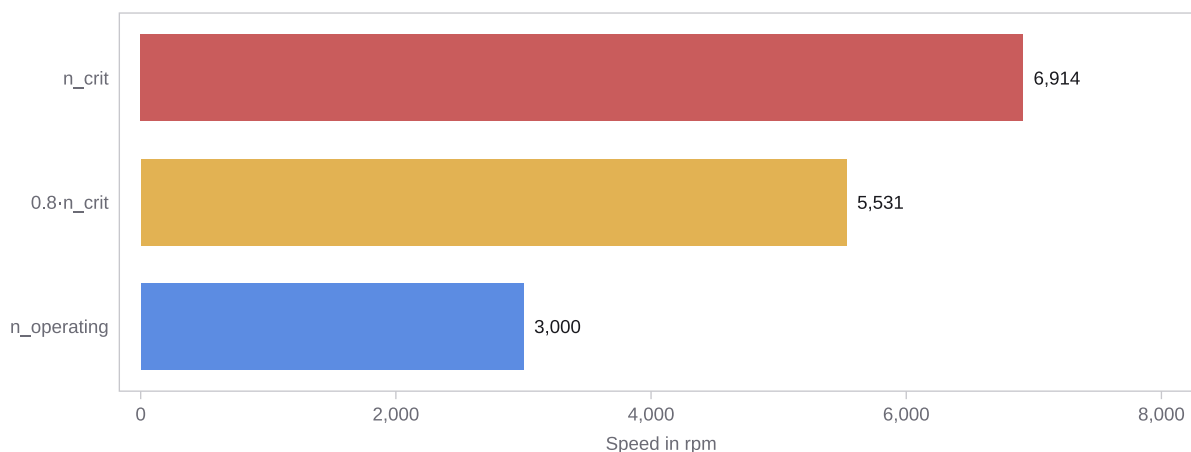
Results

Operating speed n	3,000 rpm
Drive torque M_drive	8.84 Nm
Critical speed n_crit	6,914 rpm
Allowable operating speed $0.8 \cdot n_{crit}$	5,531 rpm
DN value d0·n	75,000 mm/min
Buckling load P_crit (Euler)	61,832 N
Allowable compressive force $0.5 \cdot P_{crit}$	30,916 N
Second moment of area (core) I_y	9,547 mm ⁴
Nominal life L10	216,000,000 U
Nominal life L10h	1,200 h

Verifications

Criterion	Value	Limit	Status
Operating speed $n \leq 0.8 \cdot n_{crit}$	3,000 rpm	5,531 rpm	● OK
DN value $\leq$ limit value	75,000 mm/min	100,000 mm/min	● OK
Axial force $F \leq 0.5 \cdot P_{crit}$	5,000 N	30,916 N	● OK

Speed limits



Calculation basis

Kinematics $n = v \cdot 60 / P$ and drive torque $M_{\text{drive}} = F \cdot P / (2 \cdot \pi \cdot \eta) + J \cdot \alpha$, using the linear mass moment of inertia reduced to the screw shaft, $J = m \cdot (P/2 \cdot \pi)^2$. The critical bending speed follows the manufacturer's standard formula $n_{\text{crit}} = f \cdot d_0 / L^2 \cdot 10^7$ (bearing factor $f = 17.7$ for fixed-supported); the operating speed should not exceed $0.8 \cdot n_{\text{crit}}$. The DN value $d_0 \cdot n$ is checked against the manufacturer-specific limit value. Axial buckling stability is assessed per Euler with $P_{\text{crit}} = f \cdot \pi^2 \cdot E \cdot I / L^2$ ($I = \pi \cdot d^4 / 64$); the allowable value is $0.5 \cdot P_{\text{crit}}$. The nominal life is obtained from $L_{10} = (Ca/F)^3 \cdot 10^6$ revolutions. Reference values and factors follow manufacturer catalogs (Steinmeyer / THK / NTN-SNR).

About this sample

All values on these pages come from a freely chosen example calculation and belong to no real part. The purchased export contains the same sections with your input, your header data (project, part, prepared by) and as searchable text. Pricing and scope: maschinenbaurechner.de/en/pricing

Note: The results are design and orientation aids. They do not replace independent verification, calculation and approval by a qualified person. The terms of use at maschinenbaurechner.de apply.