

Ball Screw Calculation

Input data

Geometry

| | | | |
|-----------------------|----------|-----------------|-----------|
| Number of starts | ns | | 1 |
| Number of turns | nt | | 5 |
| Lead | Ph | | 10.000 mm |
| Lead direction | | right | |
| Ball diameter | Dw | | 5.0000 mm |
| Pitch diameter | Dpw | | 25.000 mm |
| Contact angle | α | | 40.000 ° |
| Conformity ball screw | frs | | 0.52 |
| Conformity ball nut | frn | | 0.52 |
| Axial clearance | Pa | | 0.0000 mm |
| Clearance generation | | axial direction | |
| Tolerance class | | 0 | |

Loading

| | | | |
|---------------------|-------------|---|-------------|
| Speed of inner ring | ni | | 100.000 rpm |
| | | inner ring rotates relative to load | |
| Speed of outer ring | ne | | 0.0000 rpm |
| | | outer ring is stationary relative to load | |
| Axial force | Fx | | 5000.0 N |
| Radial force Y | Fy | | 0.0000 N |
| Radial force Z | Fz | | 0.0000 N |
| Rotation around Y | ry | | 0.0000 mrad |
| Moment Z | Mz | | 50.000 Nm |
| Reliability | reliability | | 90.000 % |

Material

| | | | |
|--------------------------------|------|-----------|------------|
| Material ball screw | | Steel | |
| Material treatment ball screw | | Air-melt | |
| Hardness ball screw | HV_s | | 660 |
| Material ball nut | | 42CrMo4 | |
| Material treatment ball nut | | Air-melt | |
| Hardness ball nut | HV_n | | 660 |
| Material ball | | Own Input | |
| Youngs modulus rolling element | E_r | | 207000 MPa |
| Poisson number rolling element | nu_r | | 0.3 |

Results

Reliability factor calculated according ISO 281

Static load capacity analog ISO 76

Dynamic load capacity calculated using exponents of ISO 281

Geometry

| | | | |
|------------------|-----|--|-----------|
| Number of starts | ns | | 1 |
| Number of turns | nt | | 5 |
| Lead | Ph | | 10.000 mm |
| Lead angle | phi | | 7.2561 ° |

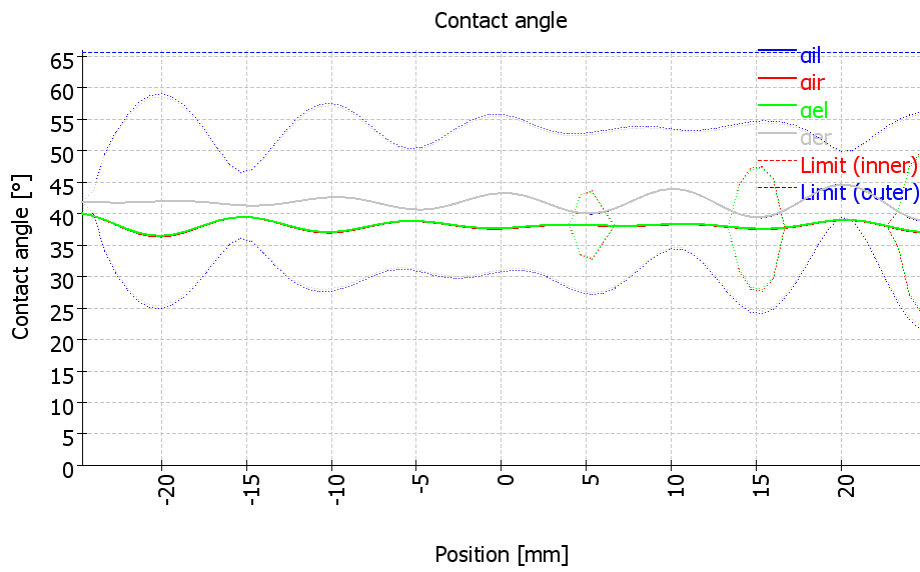
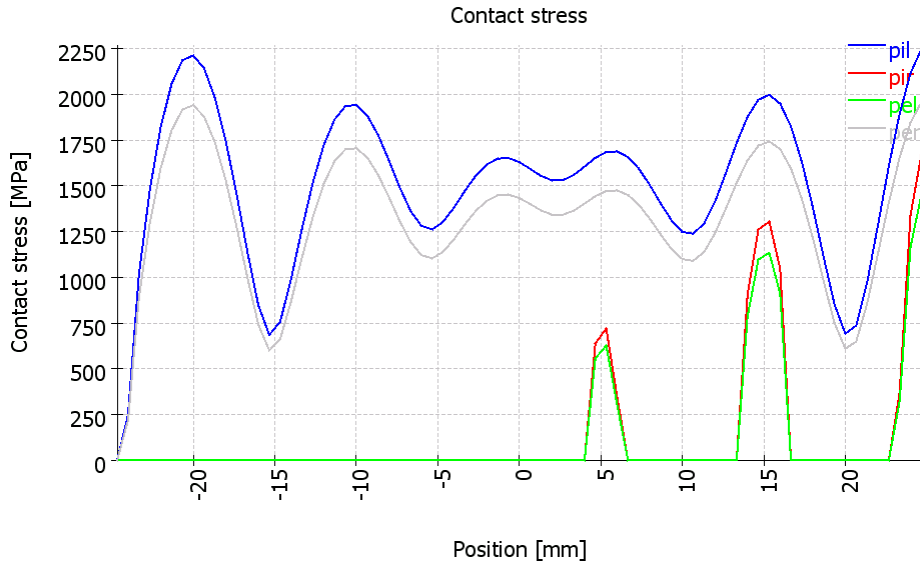
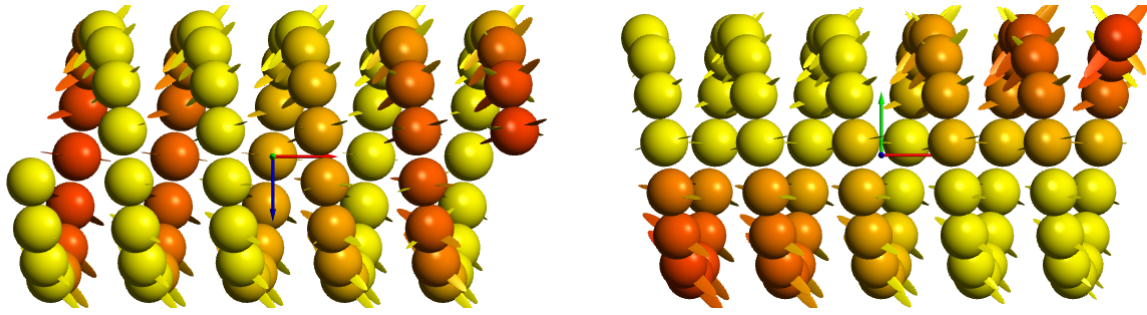
MESYS Shaft and Rolling Bearing Calculation

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| | | | |
|--|------------|-------|----------------|
| Lead direction | | right | |
| Number of loaded balls per turn | zl | | 15 |
| Ball diameter | Dw | | 5.0000 mm |
| Pitch diameter | Dpw | | 25.000 mm |
| Contact angle | α | | 40.000 ° |
| Free contact angle | α_0 | | 40.000 ° |
| Conformity ball screw | frs | | 0.52 |
| Conformity ball nut | frn | | 0.52 |
| Radius inner race | rs | | 2.6000 mm |
| Radius outer race | rn | | 2.6000 mm |
| Axial clearance | Pa | | 0.0000 mm |
| Radial clearance | Pd | | 0.0000 mm |
| Extension contact ellipse inner ring | dCiMax | | 22.425 mm |
| Extension contact ellipse outer ring | dCeMin | | 27.608 mm |
| Ellipse length ratio inner race | eLR_i | | 121.904 % |
| Ellipse length ratio outer race | eLR_e | | 123.827 % |
| Forces and displacements | | | |
| Axial force | Fx | | 5000.0 N |
| Radial force Y | Fy | | 0.0000 N |
| Radial force Z | Fz | | 0.0000 N |
| Moment Y | My | | 15.195 Nm |
| Moment Z | Mz | | 50.000 Nm |
| Displacement X | ux | | 8.4897 μ m |
| Displacement Y | uy | | 3.1421 μ m |
| Displacement Z | uz | | 0.2159 μ m |
| Rotation around Y | ry | | 0.0000 mrad |
| Rotation around Z | rz | | 0.3479 mrad |
| Maximal pressure | pmax | | 2247.0 MPa |
| Static safety factor | SF | | 6.55488 |
| Life | | | |
| Modification factor for tolerance class | fac | | 1 |
| Modification factor for reliability | far | | 1 |
| Modification factor for steel treatment (ball screw) | fm_i | | 1 |
| Modification factor for steel treatment (ball nut) | fm_e | | 1 |
| Modification factor for surface hardness (static, ball screw) | fh0_i | | 1 |
| Modification factor for surface hardness (static, ball nut) | fh0_e | | 1 |
| Modification factor for surface hardness (dynamic, ball screw) | fh_i | | 1 |
| Modification factor for surface hardness (dynamic, ball nut) | fh_e | | 1 |
| Dynamic load capacity | Ca | | 26821.2 N |
| Static load capacity | COa | | 90171.4 N |
| Reference rating life | L10r | | 57.2098 |
| Reference rating life | Lnr | | 57.2098 |
| Reference rating life | L10rh | | 9535.0 h |
| Reference rating life | Lnrh | | 9535.0 h |

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