

Rolling bearing calculation according ISO/TS 16281 for track rollers

The bearing life calculation according ISO/TS 16281 (2008) is the latest standardized method for bearing life calculations. Life is calculated considering the load distribution between the single rolling elements and is not only considering external loading but also tilting and clearance. For each of the five degrees of freedom either the load or the displacement/rotation can be provided.

As in the classical calculation according ISO 281 the influence of lubrication on life is considered either by the viscosity ration of ISO 281 or by the calculation of lubricant film thickness.

Specialties for track rollers

In contrast to bearings which outer ring is supported by the housing, no such support is available for track rollers. The load is introduced on a point on the outer ring. The outer ring is deforming which is also the reason for usually stiffer outer rings as in normal bearings.

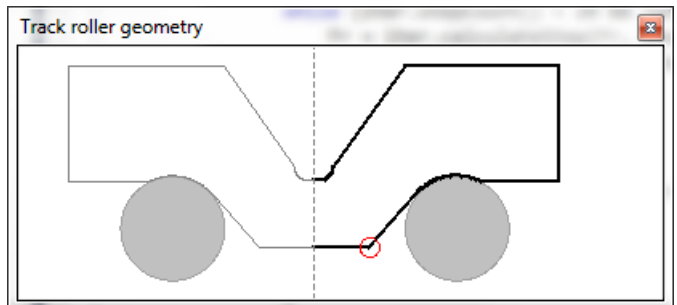
The bearings analysis software extension for track rollers allows the definition of outer ring geometry and loading in radial and axial direction on several locations on the outer ring. The load distribution is then calculated considering the elastic deformations of the outer ring.

Multi row bearings are supported. In the current version an elastic outer ring can be considered for radial deep groove ball bearings, radial angular contact bearings, radial four point bearings and radial cylindrical roller bearings.

Effective load capacities

In catalogues for track rollers often reduces effective load capacities are provided, which are considering the different load distribution. They are calculated by the software in addition to maximal permissible radial load. It is important to consider that the loading should be considered at a location of a rolling element for the calculation of load capacities, but between two rolling elements for calculation the maximal permissible radial load.

General	Bearing geometry	Bearing configuration	Material and Lubrication	Loading	Track roller
<input checked="" type="checkbox"/> consider elastic outer ring					
<input type="checkbox"/> manually enter geometry data					
	Axial [mm]	Radial [mm]	Radius [mm]	Second momentum axial direction Iaa	98.6979 mm ⁴
1	0	8.5	0	Second momentum radial direction Irr	1001.67 mm ⁴
2	0.201	8.5	0	Second momentum tangent direction Itt	1100.37 mm ⁴
3	0.601	8.9	-0.4	Second momentum axial/radial Iar	0 mm ⁴
4	2.769	12	0	Center of gravity, axial s_a	0 mm
5	7.497	12	0	Center of gravity, radial s_r	9.6228 mm
6	7.497	8.445	0	Cross section A	52.1313 mm ²
<input checked="" type="checkbox"/> geometry is symmetric					
<input type="checkbox"/> Calculate standard values (Cw, C0w, ...)					
Permissible static bending stress σ_{0Sp} 0 MPa					
Permissible dynamic bending stress σ_{0Dp} 0 MPa					
Mean stress influence ψ 0.3					



Geometry

Outer ring geometry can be defined as a polygon and radii. Also unsymmetrical cross sections are possible. The second momentums and the position of center of gravity are calculated or they can be provided by the user directly.

If the geometry is defined by a polygon and radii the software also selects the critical point for bending stresses automatically.

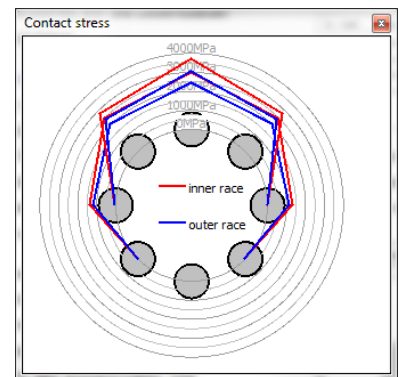
Loading

The loading of the outer ring can be specified on several locations: The only restriction is a zero torque on the bearing.

	Angle [°]	Ax. position [mm]	Radius [mm]	Fr [N]	Ft [N]	Fa [N]
1	0	1	10	-1000	0	100

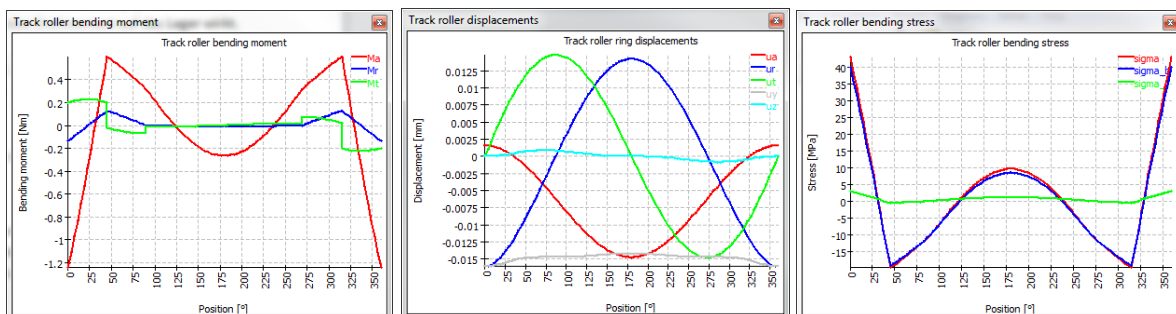
An axial load can occur in belt drives which are not exactly parallel. An axial offset of the radial load can be defined by the axial position in the inputs. Loadings on several locations can occur in bearings used for supporting a planetary gear with small rim thickness.

A load spectrum calculation is also possible with the restriction of a single load at 0° position on the outer diameter D.



Results

As Results the same values as for rigid bearings are calculated. There are life, load distribution, lubricant film thickness, extension of contact ellipsis and more. In addition for track rollers the effective load capacities, the permissible radial load, the stresses in outer ring and the deformations of outer ring are given.



Results are provided as a configurable result overview, as graphics and as an extensive PDF report.

Contact

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