# MESYS Shaft Calculation

The shaft calculation allows the calculation of displacement, forces and bearing life for several connected coaxial shafts. The MESYS Rolling Bearing Calculation according ISO/TS 16281 is included in the software and the nonlinear stiffness of rolling bearings in considered.

Because of the nonlinear bearing stiffness shafts with more than two bearings can be calculated with accurate bearing forces as result. Pretension of bearings can be considered. Combinations of angular contact bearings can be easily considered as bearing set:
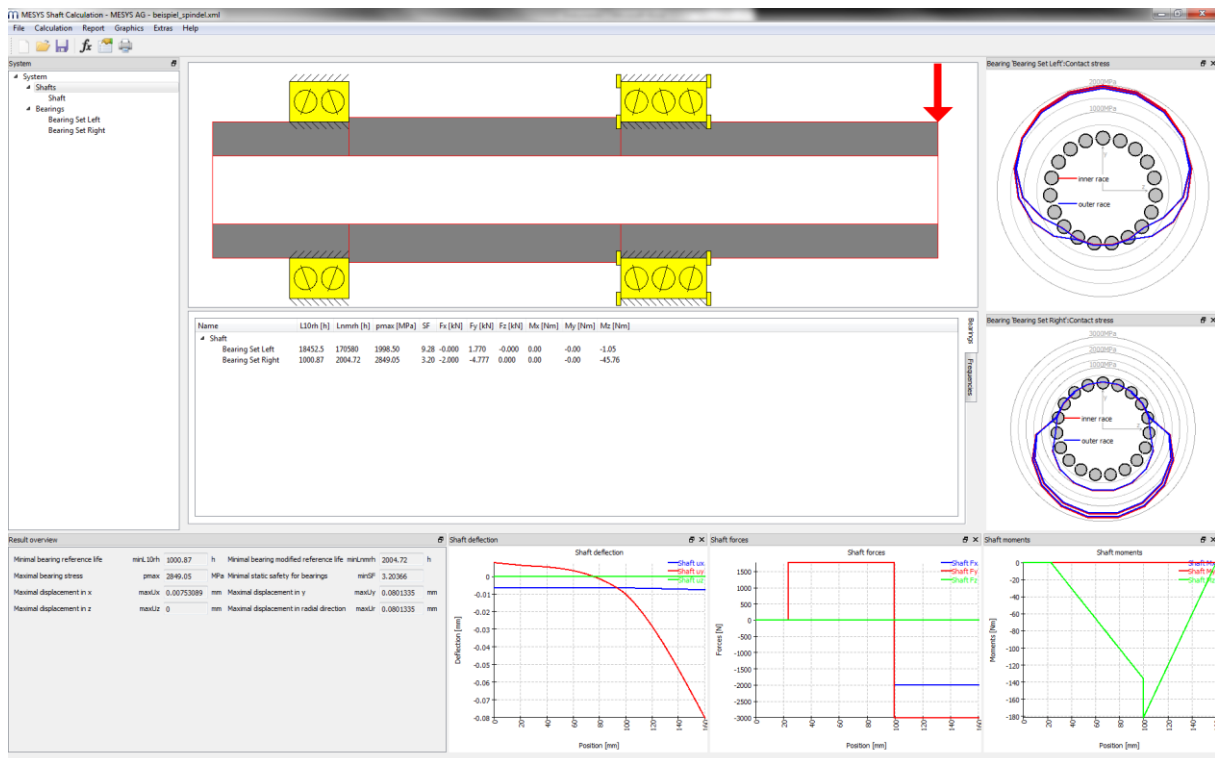
Shaft geometry can be defined using an arbitrary number of cylindrical and conical elements for inner and outer geometry. The geometry input is done using tables.

Loads can be specified as centrical or excentrical forces or as complex load elements like a gear. Boundary conditions are some rigid constraints, springs, constraints with offsets, clearance and stiffness or a rolling bearing. There is no restriction in the number of loads or constraints.
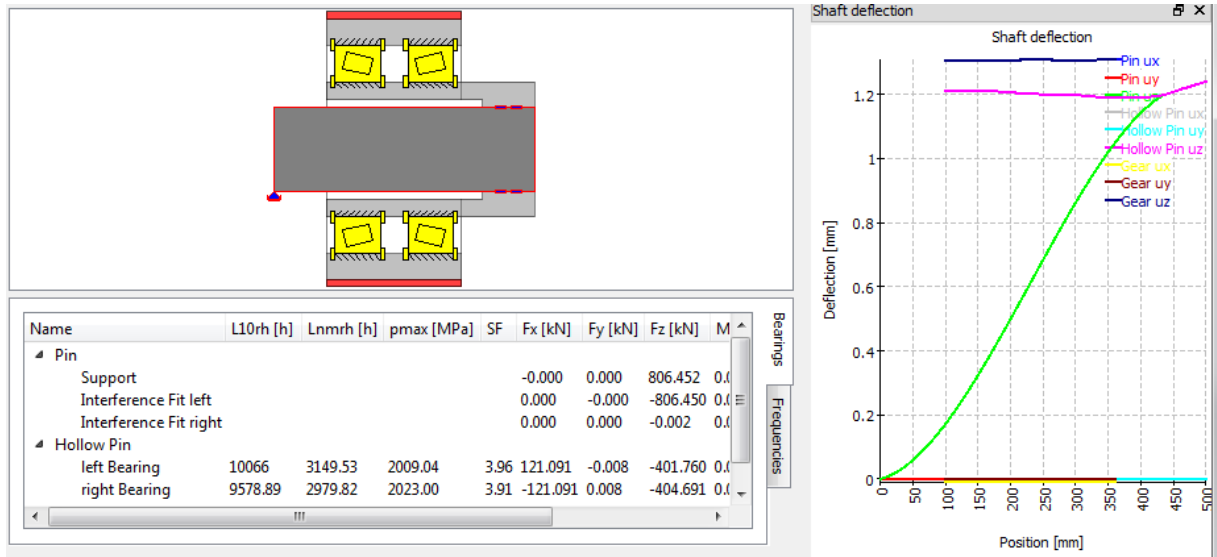

Several coaxial shafts can be defined and connected by rolling bearings or general supports. Shear and axial deformations are considered, a nonlinear shaft model can be used optionally.
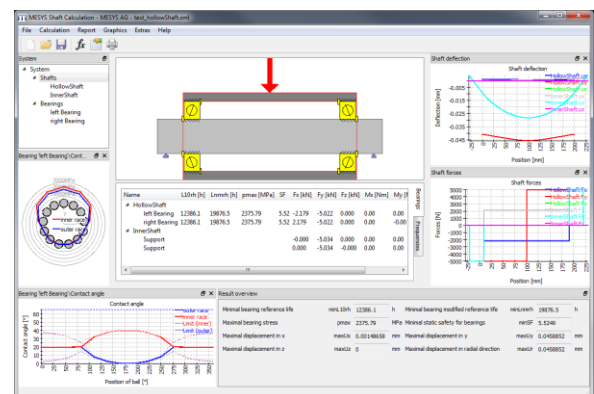
Results are provided in a results overview, an additional table for bearing results, several graphics and a PDF report which also includes graphics.

Planetary gear on a flex pin

An example for the usage of several coaxial shafts is the support of a planetary gear using a flex pin. A pin is fixed in the planet carrier on the left side. On this pin there is a hollow shaft which is connected to the planetary gear with taper roller bearings in this example. A seen in the diagram for deflection, the gear stays horizontal and just moves horizontally because of the configuration. Because of the centrical loading both bearings carry the same load. The axial load is introduced by contact angles of the bearing

Name	L10rh [h]	Lnmrh [h]	pmax [MPa]	SF	Fx [kN]	Fy [kN]	Fz [kN]	M
▲ Pin								
Support					-0.000	0.000	806.452	0.0
Interference Fit left					0.000	-0.000	-806.450	0.0
Interference Fit right					0.000	0.000	-0.002	0.0
▲ Hollow Pin								
left Bearing	10066	3149.53	2009.04	3.96	121.091	-0.008	-401.760	0.0
right Bearing	9578.89	2979.82	2023.00	3.91	-121.091	0.008	-404.691	0.0

Natural frequencies and mode shapes

Natural frequencies are calculated considering bending, axial, and torsional modes. These modes can be coupled, like seen here for an axial mode (red) with a bending mode (blue), because of the bearing stiffness.
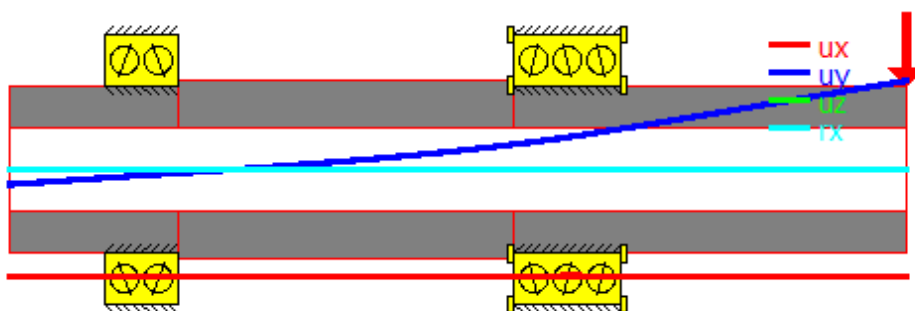
Additional masses can be defined for each shaft. The gyroscopic effect can be considered and a Campbell diagram is also provided in the software.

Contact

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A demo version and the software documentation are available as download on the website. Please ask for a test version without restrictions.