![MESYS AG logo] Engineering Consulting Software

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MESYS Shaft Systems Calculation

The shaft system calculation enables the analysis of complete gear systems, taking into account gears, shafts, and bearings. Shafts can be connected via gear meshes or belts, and general planetary stages can also be modelled and analysed.

Shaft speeds are determined based on the defined gear connections. Calculations with load spectra as well as the analysis of shifting gearboxes are supported.
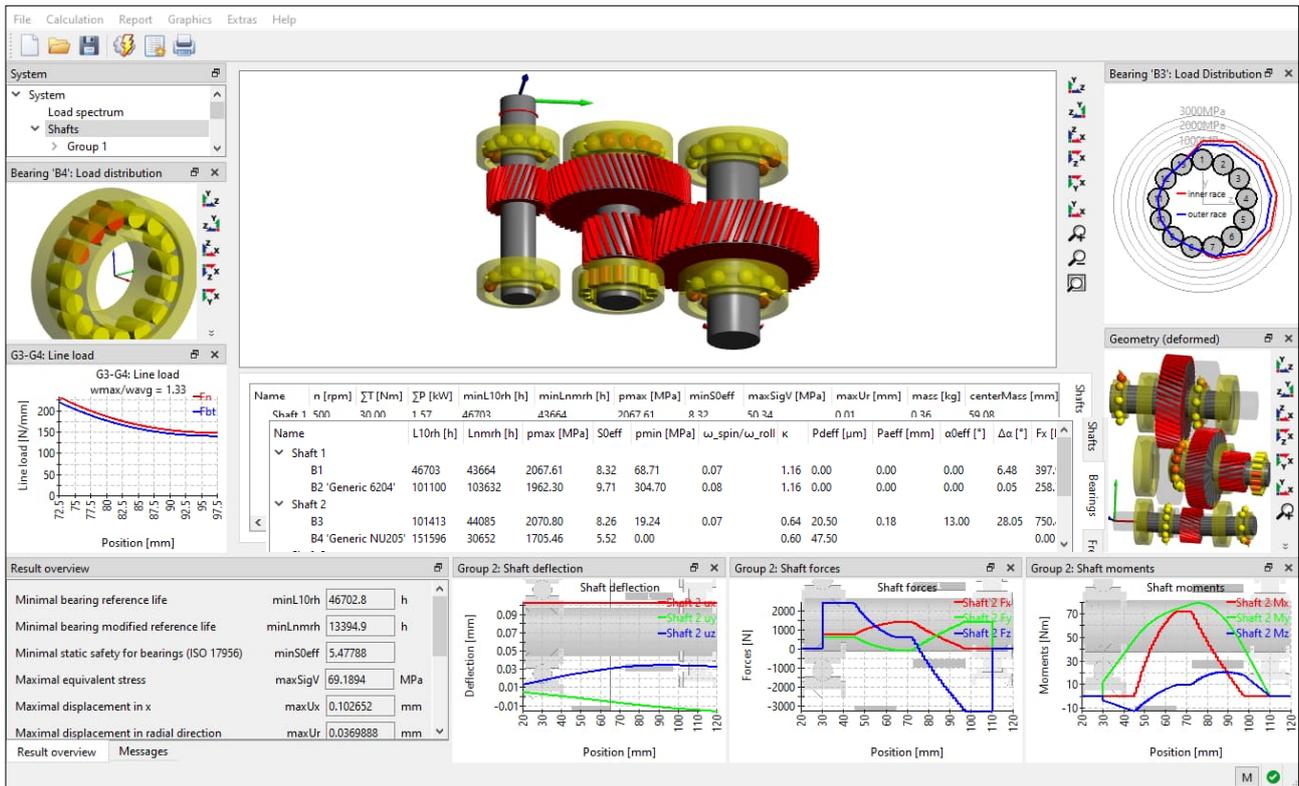
Cylindrical gears are modeled as line loads with a defined mesh stiffness. The load distribution across the face width provides an indication of required flank line modifications.

With the integrated ylindrical gear calculation according to ISO 6336, the following diagrams can be generated for the gear meshes:

- Specific sliding over diameter
- Specific sliding over profile shift
- Safety factors over profile shift
- 2D-FEA Tooth root stress graphical or as colour plot
- Tooth manufacturing, displayed both statically and as animations
- 2D & 3D Gear geometries
- Gear engagement 2D & 3D
- Safety factors, limiting stress, permissible stress, permissible torque over life
- Contact temperature
- Load distribution factor
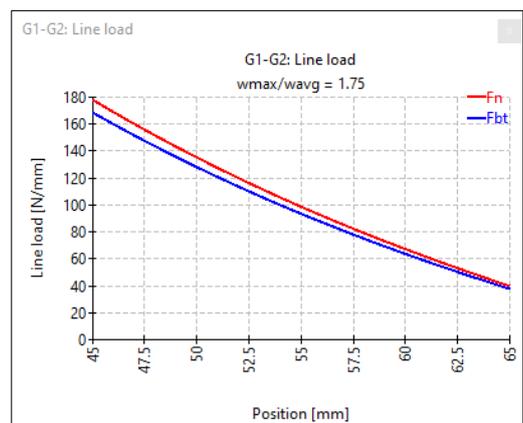
In addition to defining gear loads as force elements on the shaft, gear data can also be specified directly at the connections.

Gear pairs can be linked to external gear calculation programs. The resulting safety factors are available in the results overview of the shaft calculation.

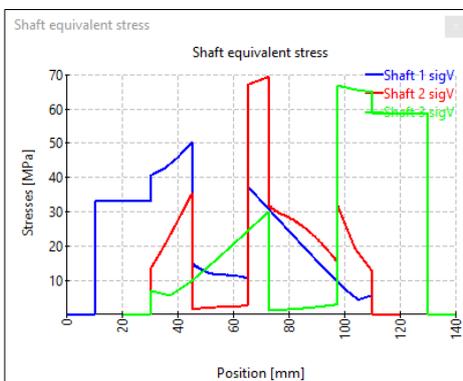## Natural frequencies on system level

Eigenfrequencies are also calculated at the system level. Gear meshes couple axial, bending, and torsional vibrations. Mode shapes can be animated in the 3D view.

	Color	Color	
Shaft	Shaft 2	Shaft 3	
Gear	G3	G4	
Position	65	65	mm
Number of teeth	20	50	
Width	25	25	mm
Profile shift coefficient	-0.302744	-0.0270671	
Normal module		m_n 1.75	mm
Normal pressure angle		α_n 20	°
Helix angle		β 20	°
Helix direction	Helix left hand	Helix right hand	
Center distance		a 64.585	mm
Circumferential backlash		j_t 0.1	mm
Gear mesh stiffness		c_γ 20	N/mm/µm
Efficiency		η 100	%
Calculation	MESYS		

Cylindrical gear pair | Tooth flank modifications | Excitation

Import / Export

The shaft system import function allows existing shaft systems to be imported. Either a file from the MESYS shaft calculation can be selected or a file in REXS format.

The shaft system export function enables exporting the system in REXS format. This format allows data exchange with other CAE software.
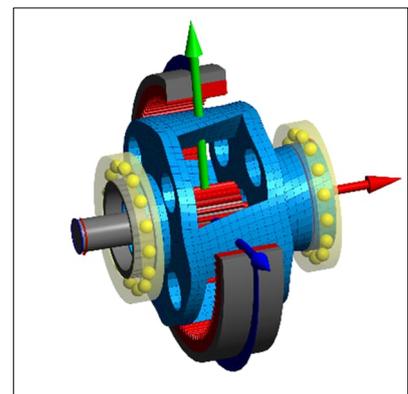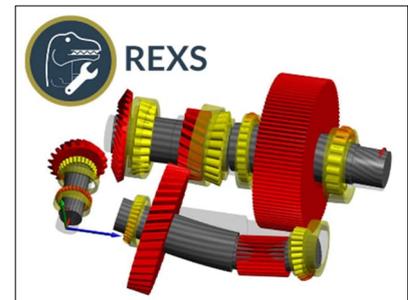

Strength calculation

Shaft strength is calculated according to DIN 743 (2012). All notch factors defined in the standard are available for selection.

In calculations with load spectra, either an infinite life verification can be performed for each load case, or a calculation with an equivalent stress amplitude according to DIN 743 Part 4 can be carried out.

FEM-Integration

In the MESYS shaft system calculation, FEM-based 3D-elastic parts can be integrated to represent stiffness more realistically. Components such as shafts, housings, planet carriers, or gear bodies can be considered as elastic structures. Their deformations are directly included in the calculation, for example by being represented as deformations of the bearing rings.

Contact

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A demo version and the software documentation are available for download on the website. Please contact us to request a trial version without limitations.