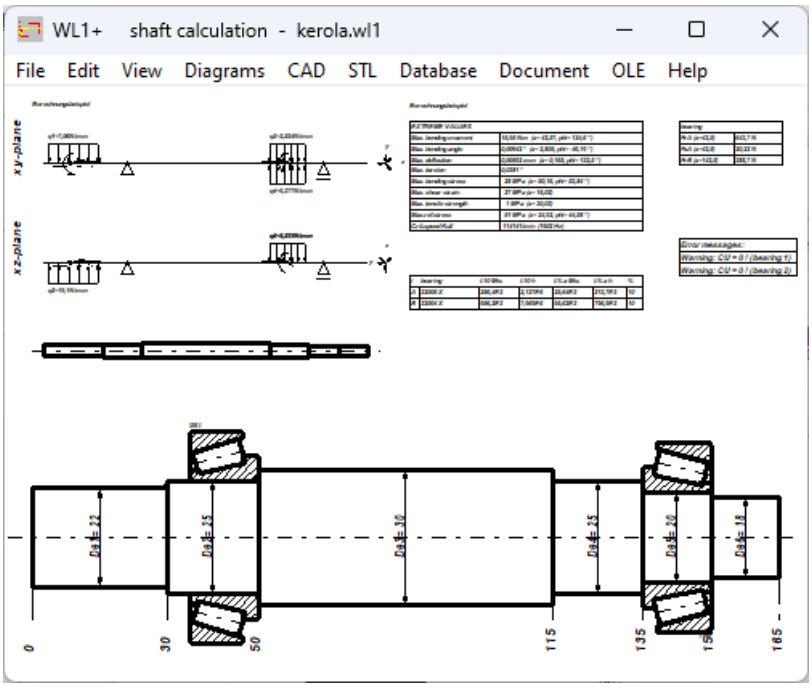
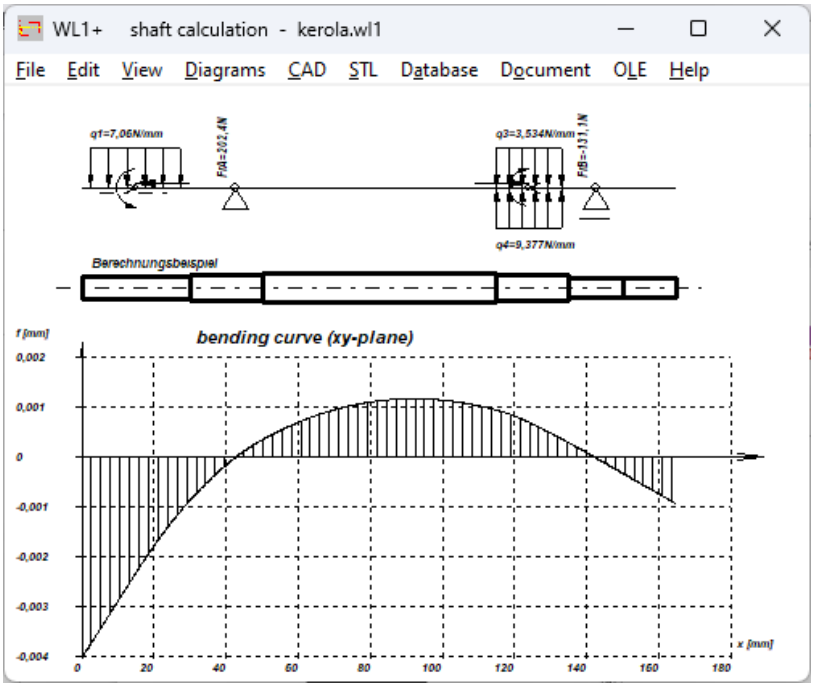
W L 1 +

Software for Shaft Calculation

incl. Roller Bearing Design

for Windows





Shaft Calculation
WL1+ calculates load, stresses, bending line, torsion, critical speed, statical and dynamical safety. Load bearing capacity can be calculated according to DIN 743. WL1+ also calculate endurance safety and life expectancy of roller bearings by means of the integrated roller bearing database.

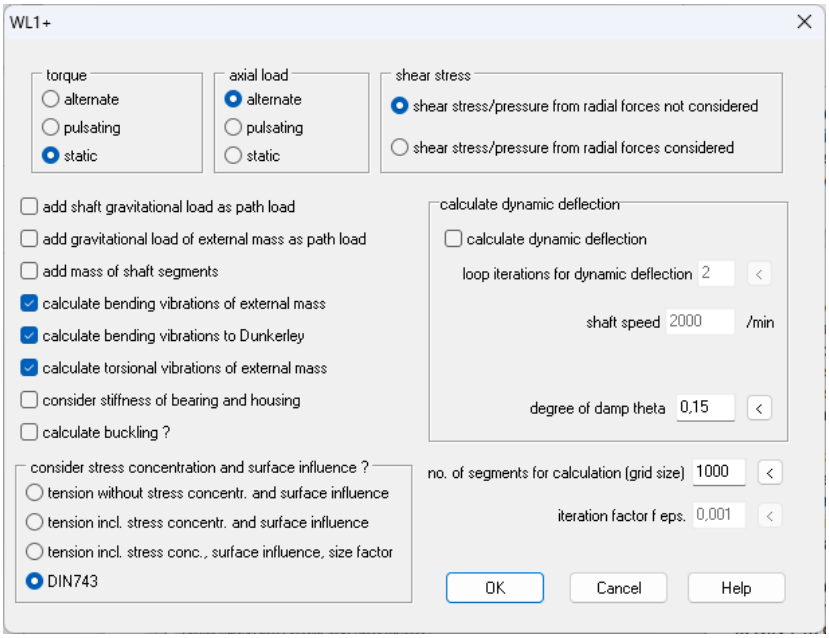
Shaft and Load
The shaft is built from up to 100 cylindrical or conical sections. Up to 50 individual forces, path loads, bending moments, torques and axial forces can be assigned. WL1+ converts stress from gears into path loads, axial forces, torques and bending moments.The easiest input method is, however, to import the gear forces calculated by our gear program ZAR1+.

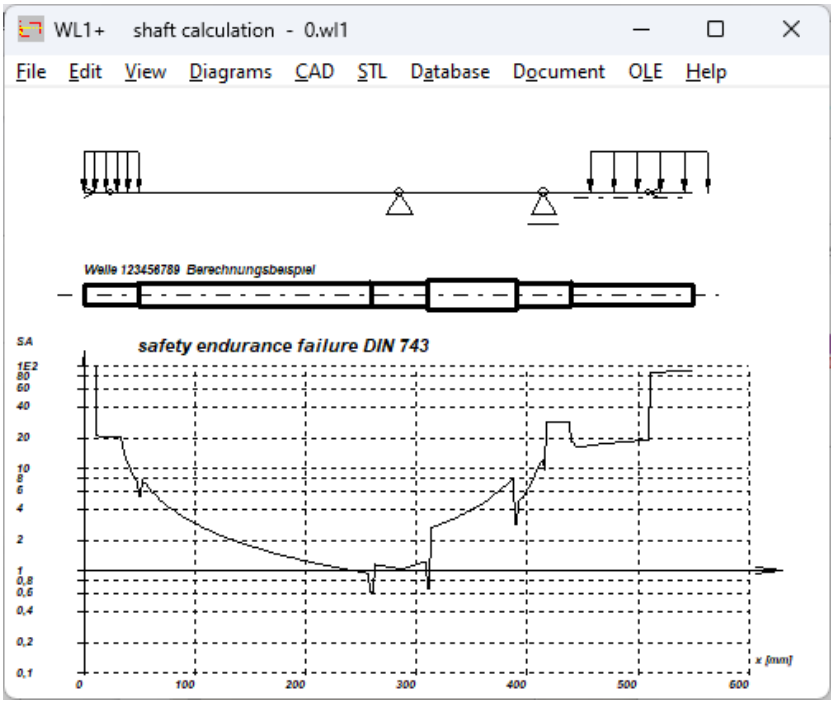
Stress Concentration Effect
The increased stress at shaft transitions is automatically taken into account when you enter surface values, sensitivity factors and transition radius. Zones with increased stress concentration effect (e.g. from sliding key grooves) can be taken into account by entering beta k, beta kb and beta kt when calculating torsion and bending stress.

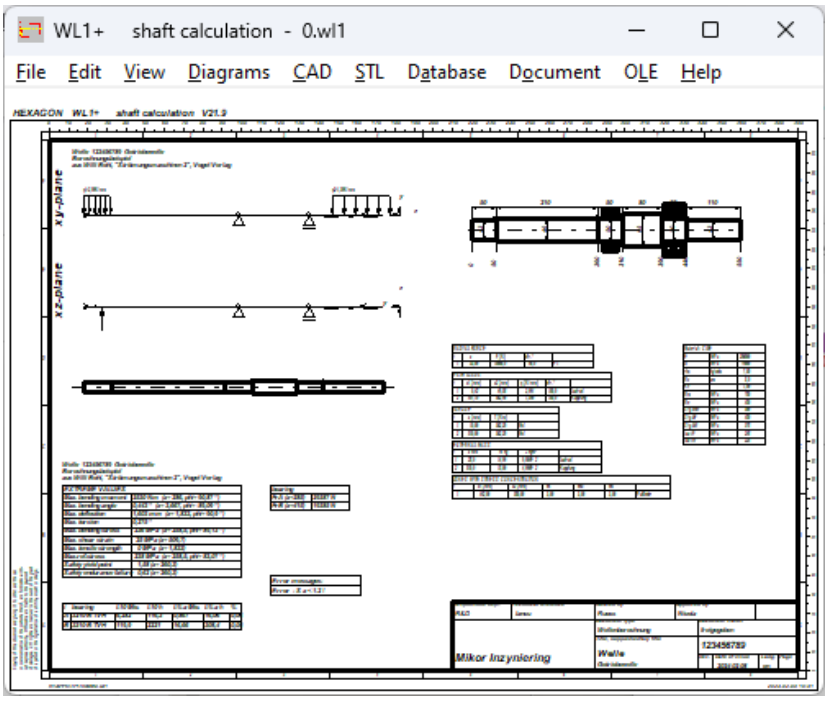
Bearings
WL1+ calculates statically determinate bedded shafts with fixed and loose bearings, fixed clamping and radial thrust bearings (each bearing absorbs axial forces in only one direction). In addition, statically undeterminate supported shafts with 3, 4 or 5 bearings can also be calculated.

Material Database
WL1+ provides material data according to DIN 743. Further steels and non-ferrous metals are made available by accessing the WST1 material database

Critical Speed
The resonance speed for bending vibration and torsional vibration are calculated from the shaft inherent mass and external masses (e.g. rotor body, gear wheels, belt pulley) according to the Kull & Dunkerley method.







Reference Stress
It is possible to calculate reference stress from the bending, tension and shearing stresses according to the maximum stress theory, maximum shear theory or maximum distortion energy theory.

Safety factors
Safety factors (endurance failure and yield stress) according to DIN 743 can be displayed as diagram.

Rolling Bearing Database
WL1+ includes database files with 600 deep-groove ball bearings, 100 self-aligning ball bearings, 70 needle bushes, 170 needle bearings, 500 cylindrical roller bearings, 300 tapered roller bearings, 360 self aligning roller bearings, 100 angular contact ball bearings and 230 needle roller cages.

Diagrams
Torque, bending moment, bending angle, deflection line, bending stress, shearing stress and reference stress curves provide important information. You can print the charts, or load into your documentation.

Rolling Bearing Calculation
On the basis of the calculated bearing loads, you can choose the appropriate bearing from database. WL1+ calculates life expectancy according to DIN and ISO.

Printout
The printout shows the extreme values for bending moment, deflection, bending stress, shear stress and reference stress along with shaft weight, mass moment of inertia, centre of gravity, bearing loads, bending angle an the bearing positions, bearing life expectancy, resonance speeds, material values and input data.

Quick View
Quick View shows essential drawings, diagrams and text altogether on one graphic screen.

CAD Interface
You can export true-scale drawings of shaft with roller bearings to your CAD system vis DXF or IGES file.

HEXAGON Help System
For explanation of the input data you can display help text and pictures. WL1+ provides error messages for input errors and when value limits are exceeded. For each error message you can display more detailed information and suggestions for remedial action.

Hard-and Software requirements
WL1+ is available as 32-bit app or 64-bit app for Windows 11, Windows 10, Windows 7.

Guarantee
HEXAGON gives a 24-month guarantee on full functionality of the software. Customers will be informed regularly about updates and new features.