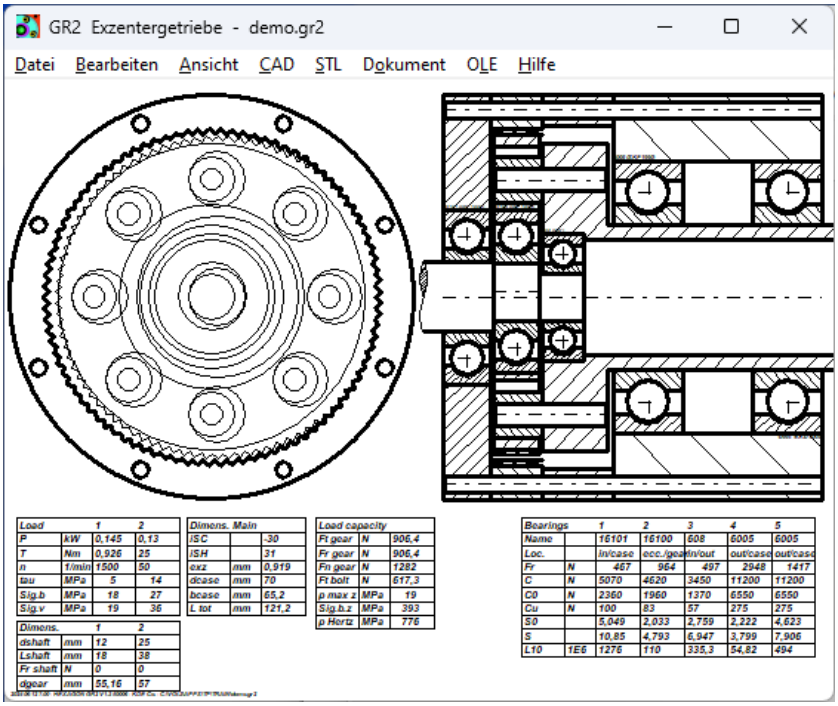
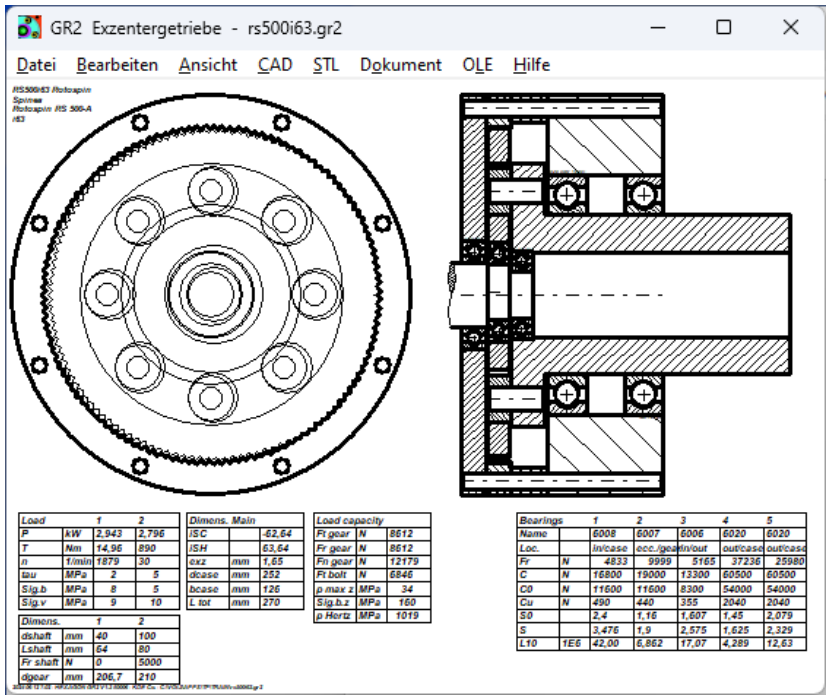
G R 2

Eccentric Gear Design

Software for Windows





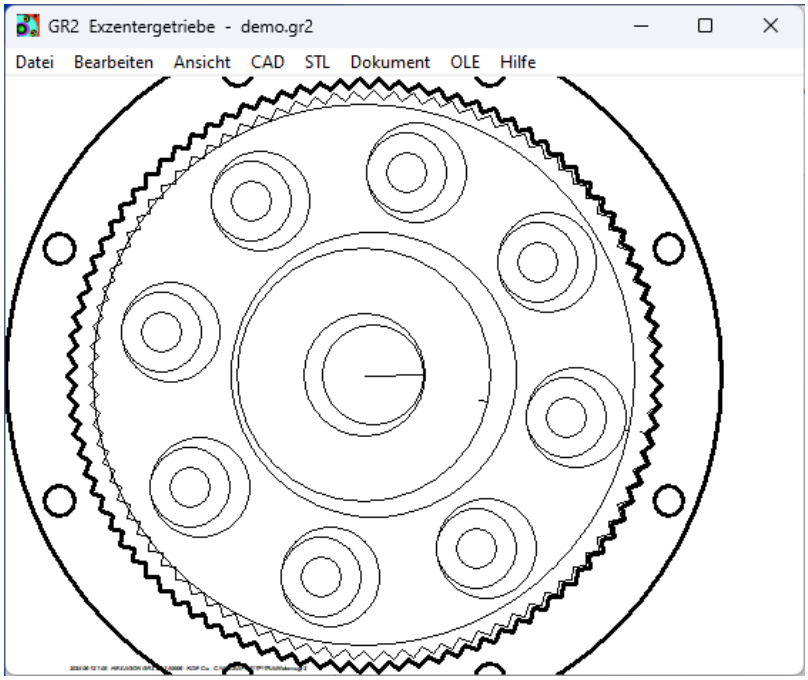
Software for eccentric gears
Eccentric gears are characterized by a large gear ratio (20 .. 100) with low backlash and relatively small dimensions.

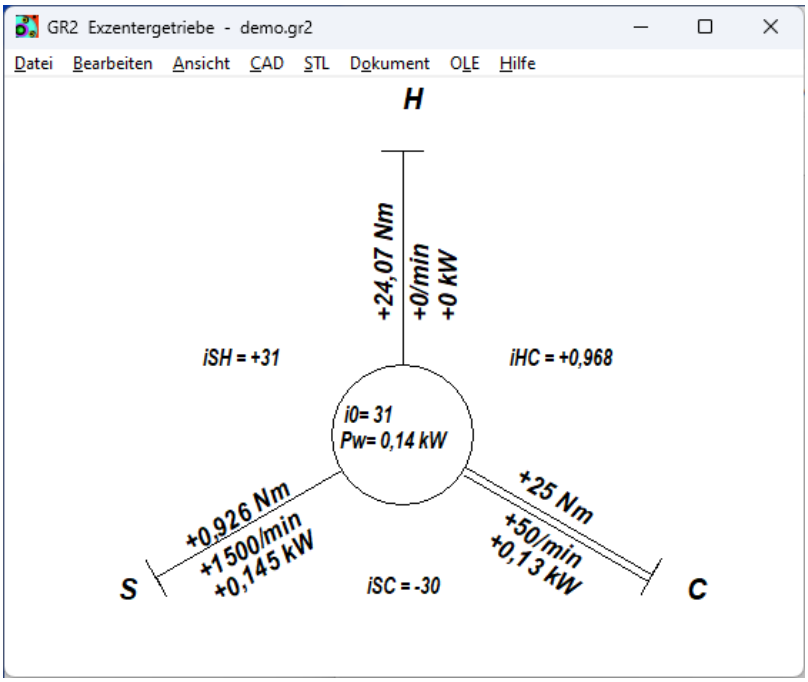
Gears
The core of the gear is a ring gear on which a planetary gear rolls. The number of teeth on the ring gear and planetary gear typically differs by only 1 to 3 teeth in order to achieve a high gear ratio (i = zP/ (zH-zP) with a fixed ring gear). The gearing can be an involute gearing, and a friction gear would also be theoretically possible.

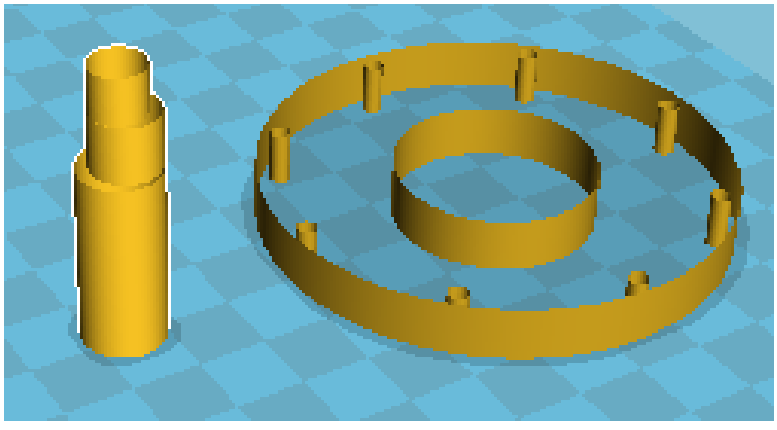
Drive and output
The planetary gear is driven by an eccentric shaft. The output shaft takes over the counter-rotation of the planetary gear around the center by means of rollers that engage in holes in the planetary gear (larger by the eccentricity). If the output shaft is blocked and the output is via the ring gear, the transmission ratio is slightly higher (i= zH / (zH-zP) and the direction of rotation is the same.

Rolling bearings
The drive shaft and output shaft are each supported by two bearings, with one side of the drive shaft being supported in the driven shaft. The fifth rolling bearing is used to support the planetary gear on the eccentric shaft. The GR2 software is supplied with databases of deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings, tapered roller bearings, needle bearings, etc.

Preliminary design
In the preliminary design, suggestions for the diameter of the drive shaft, output shaft and gearing are made from the transmission ratio and performance data. This results in the dimensions of the rolling bearings and gears, eccentric shaft and output shaft, bearing caps on the drive side and output side.







Dimensions
In the dimensions input window, you can optimize and adjust the data from the preliminary design. It is advisable to start by selecting the rolling bearings from the database. After the 5 rolling bearings have been determined, most of the dimensions are fixed. GR2 calculates suggested values for the remaining data fields on request.

Calculation
GR2 calculates the safety and service life of the rolling bearings. The most important loads and stresses on the gear components are also calculated. However, the gear pair is not calculated. For the precise calculation of the individual components, there are interfaces to HEXAGON software for gear calculation and shaft calculation.

Data transfer to calculation programs
GR2 generates files with gear data and load data from the ring gear and planet gear, which can be opened and calculated directly with HEXAGON ZAR1+. GR2 generates ready-made wl1 files with shaft geometry and loads from the drive shaft, output shaft, and drive pin on the output shaft, which can be opened and calculated directly with HEXAGON WL1+ for shaft calculation.

Wolf diagram for planetary gears
An eccentric gear can be calculated and displayed like a planetary gear. Sun gear S is the eccentricity of the drive shaft, carrier C is the output shaft.

Animation
In an animation, the calculated eccentric gear can be shown on the screen with rotation of the planing gear, drive shaft and output shaft.

Model gear from 3D printer
GR2 generates STL files for 3D printing of drive shaft, output shaft, bearing cover, spacer ring, rollers. STL files of planetary gear and ring gear can be obtained from ZAR1+. All that is missing are rolling bearings, screws and pins to build a functional model of the calculated eccentric gear.

CAD interface
Drawings and diagrams can be imported into CAD to scale as DXF or IGES files.

Scope of delivery
Calculation program with user manual (pdf), perpetual license for unlimited right of use with update authorization.

System requirements
GR2 is available as a 32-bit and 64-bit application for Windows 11, Windows 10, Windows 7.

Warranty
HEXAGON gives a 24 month guarantee on full functionality of the software. We provide help and support by email without extra charge. Registered users are regularly kept informed of updates and new editions.