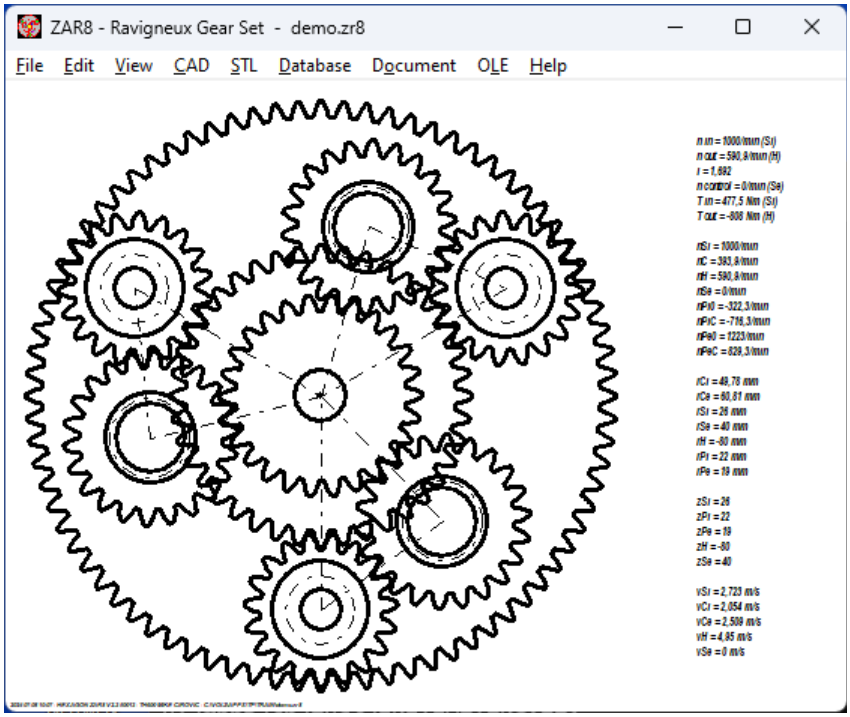
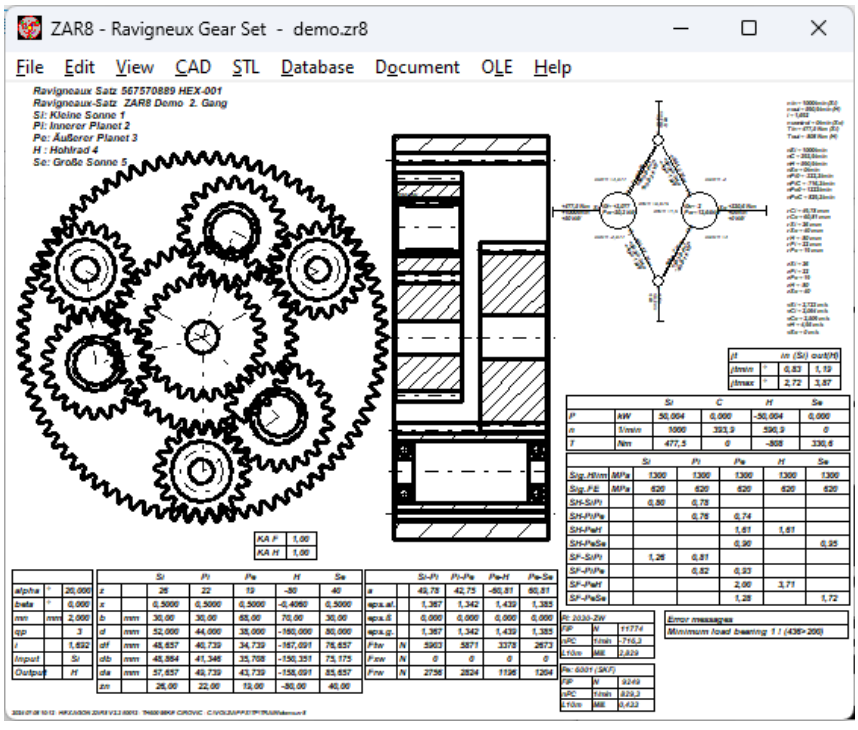
ZAR8

Ravigneaux Planetary Gear Set

for Windows





Calculation Base

A Ravigneaux planetary gear set is composed of two planetary gears: A plus planetary gear and a minus planetary gear. Plus and minus planetary gears are connected by common ring wheel and common carrier. And planet wheels of the minus planet gear are outer planet wheels of the plus planet gear. ZAR8 calculates kinematics, dimensions and strength of Ravigneaux planetary gear sets. For calculation of gear dimensions and strength, the Ravigneux gear set is separated into four tooth contact pairs: small sun wheel Si with inner planet wheel Pi, inner planet wheel Pi with outer planet wheel Pe, outer planet wheel Pe with hollow wheel H, and large sun wheel Se with planet wheel Pe. Dimensions are calculated according to DIN 3960, Deviations according to ISO 1328, tooth thickness tolerances to DIN 3967, and strength according to ISO 6336.

Pre-Dimension

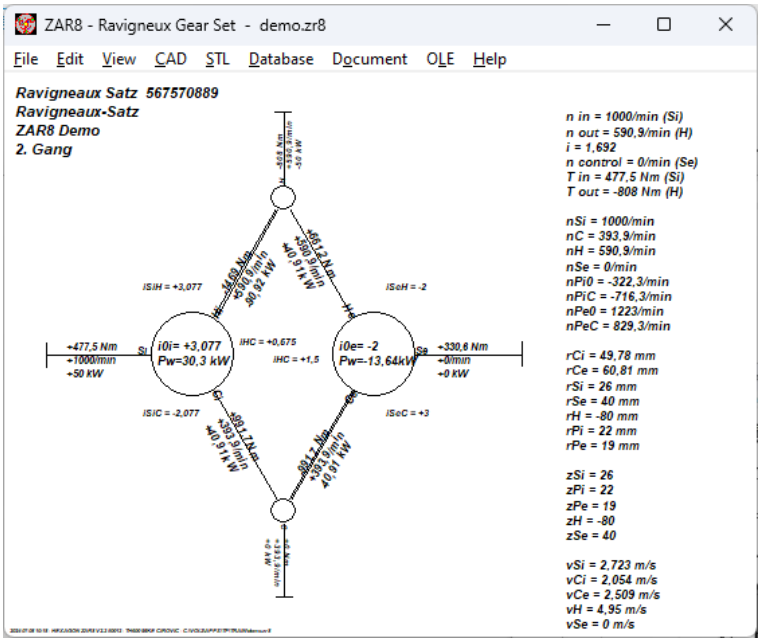
In Pre-Dimension, ZAR8 suggests dimensions of a Ravigneaux gear set after input of transmission of forward gears 1 and 4, input speed, power and number of teeth of the ring gear.

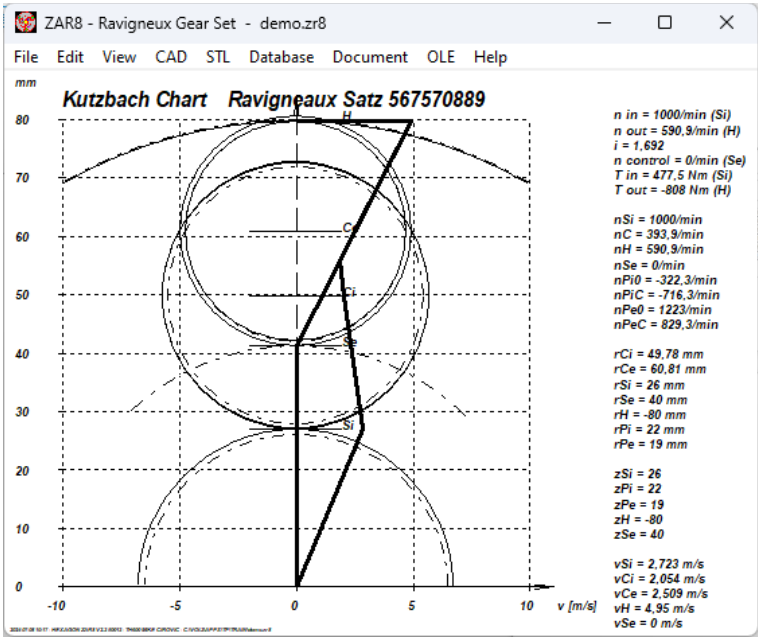
Gear Dimensions

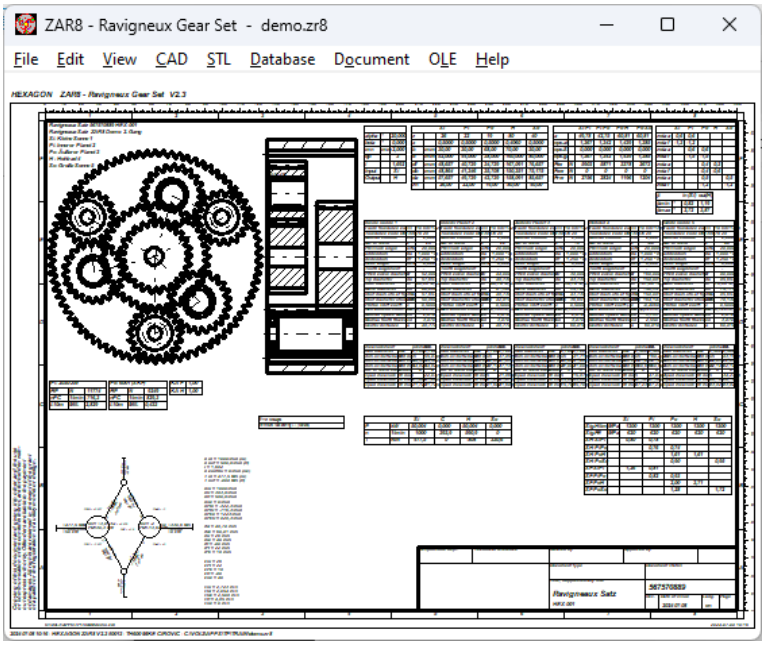
Pressure angle, helix angle, number of teeth, face width and center distance can be modified and optimized in a dialogue window. Reference profile can be a standard tool according to ISO 53 (DIN 867), or you can define a profile by input of tooth height coefficients and fillet radius. Even chamfer and protuberance profiles can be calculated. ZAR8 calculates tooth thickness, clearance, span width and dimensions over/between pins and balls from tooth quality and tolerance zone. Diagrams show specific sliding along the tooth contact line.

Strength Calculation

Load-bearing capacity with safety factors SF for tooth root fracture and SH for pitting according to ISO 6336. If safety factors less than 1.0, ZAR8 calculates time until tooth root fracture or pitting.







Roller Bearing Calculation
ZAR8 calculates life expectation of groove ball bearings, needle bushes, needle bearings, cylindrical roller bearings, tapered roller bearings and self-aligning roller bearings if used as planet wheel bearing. Database files with roller bearing properties are delivered with ZAR8.

Load Spectrum
If you define a load spectrum by input of torque spectrum and load cycle shares, ZAR8 calculates safety factors and life expectation.

Kutzbach Chart
Kutzbach chart shows speed vectors of small and large sun, inner and outer planet, ring gear and carrier.

Wolf Chart
The Wolf chart shows distribution of torque and power to two planetary gear sets and four shafts.

Animation
Animation rotates the planetary gear on screen. You can define start/end position and number of steps.

Quick View
Drawings and tables with gear data and calculation results are printed altogether on one screen.

Production Drawing
For each gear wheel (S, Pe, Pi, H) you can generate a production drawing with ISO 7200 header, ready to print or for use in CAD.

Gear Combinations
ZAR8 calculates 24 combinations with blocked control shaft, including 4 predefined forward gears and one reverse gear.

CAD and STL Interface
Drawings, tables and diagrams can be generated as DXF or IGES files and used with CAD. Sun wheels, planet wheels, ring wheel (if spur gears) and carrier can be generated as STL file and printed on 3D printer.

Databases
ZAR8 includes dbf database files with gear materials, tooth profiles and roller bearings.

HEXAGON Help System
Auxiliary text and images are available. If error messages, you get description and remedy.

System Requirements
ZAR8 is available as 32-bit app or as 64-bit app for Windows 11, Windows 10, Windows 7.

Scope of Delivery
Software with user manual (pdf), non-expiring license for unlimited time use with update rights.

Guarantee
HEXAGON gives a 24 month guarantee on full functionality of the software. We provide help and support by email without extra charge. ZAR8 is constantly being improved and updated.