ZAR4

Non-circular Involute Gear Wheels
Non-linear Spur Gears

for Windows
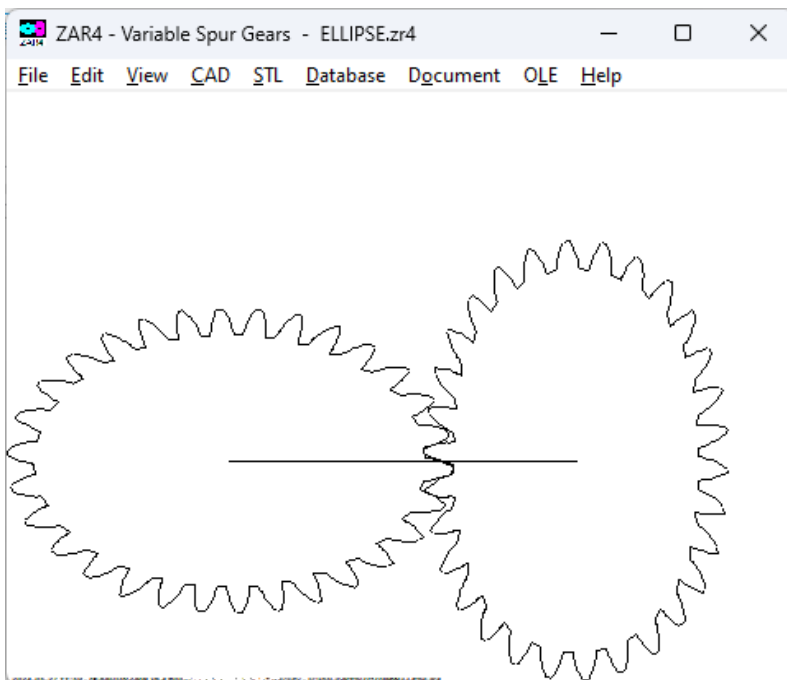
Calculation

Base Pitch curve of a variable gear can be described by mathematical functions, or from standard geometries ellipse (or circle), sine, sine-linear, polygon, eccentric circle. Or you can define the pitch curve by up to 10 mathematical formulas for pitch radius r as function of rotation angle x. The mathematical functions *"+ - * / SIN COS ARCTAN LN LOG EXP FAK SQR SQRT PI E X"* may be used. A scope has to be defined for each formula, i.e. f(x)=100 for x=0° until x=60°, f(x)=100+X for x=60° until x=180°, and so on until x=360°. Or you can define pitch curve by a polynomial function, or input some points on the pitch curve and let ZAR4 calculate the polynomial function. Standard pitch curves ellipse, sine, sine-linear, polygon und eccentric circle can be selected directly with input of diameters and other parameters. ZAR4 calculates center distance and pitch curve of the counter wheel, and the tooth profile for given pressure angle, teeth numbers of driving gear and driven gear.
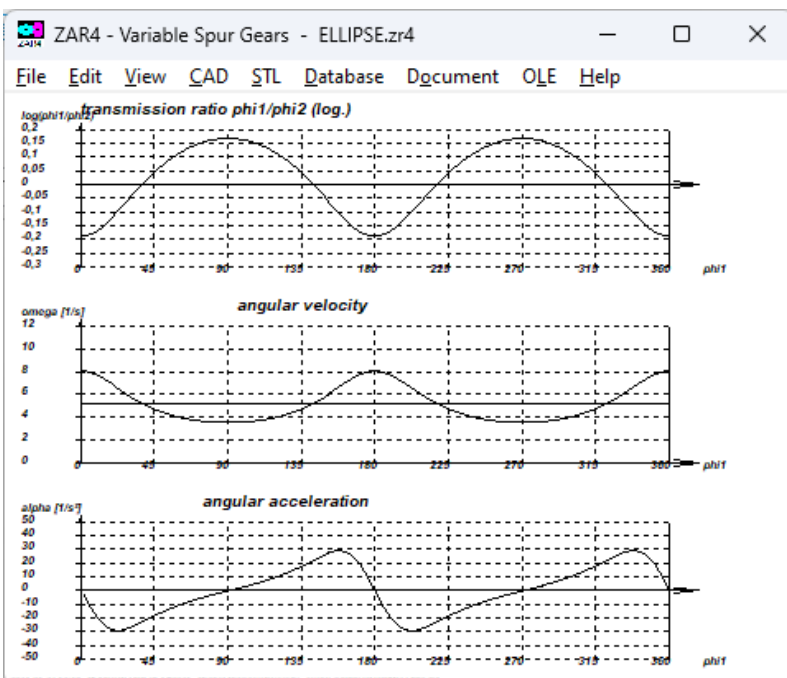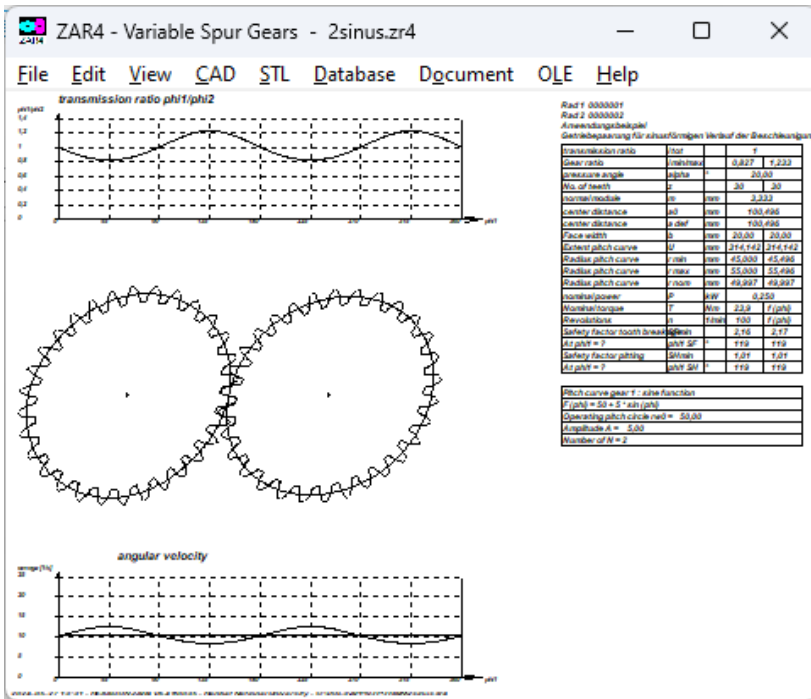
Gear Dimensions

Pressure angle, number of teeth, face width and transmission ratio are defined in "tooth dimensions" dialogue window. Profile can be optimized by modification of the parameters. Gear module will be calculated by number of teeth and pitch curve and may be variable or constant. If the defined variable, module is calculated of pitch radius (m=2*r/z). If constant, mean module is calculated from circumference of the pitch curve (m=U/(pi*z). Transmission ratio must be integer, default is 1. As reference profile you can use a standard profile to ISO 53, or define rack profile by input of tooth height coefficients.

Strength Calculation

ZAR4 calculates load capacity of a virtual round spur gear according to ISO 6336 or DIN 3990. Safety factors SF for tooth breakage and SH for pitting kann can be displayed in a diagram as function of the rotation angle (pitch curve angle).

ZAR4 - Variable Spur Gears - 2sinus.zr4

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ZAR4 - Variable Spur Gears - ei.zr4

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ZAR4 - Variable Spur Gears - ellip2.zr4

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Tooth Contact
Graphic ZAR4 draws the gear in any rotation angle. Tooth contact graphic and animation can be used to detect tooth collisions.

Animation
ZAR4 rotates gear wheels or pitch curves in an amimation on screen. You can define start angle, end angle, and number of steps.

Diagrams
ZAR4 calculates transmission ratio, angular velocity and angular acceleration along one revolution of the driving gear (360 deg). Results can be displayed as diagrams.

Material Data Base
Material properties can be loaded from the integrated material database with gear materials.

Text Printout
Input data and calculation results may be printed, saved as text or HTML file, or exported to MS Excel.

Graphic Printout
Drawings and diagrams can be printed on any Windows printer.

CAD Interface
Drawings and diagrams can be exported to CAD via DXF or IGES interface.

User Interface
The dialogue windows of ZAR4 allow even the less experienced PC user to find his way around the program quickly. ZAR4 provides users with a relevant help text wherever they are in the program. When the demo mode is selected, ZAR4 runs through a demo program in which an example calculation is performed. If error messages appear, users can get description and remedy suggestions.

Units
ZAR4 can be switched between metric units (mm, N,MPa) and imperial units (inch, lbf, psi).

System Requirements
ZAR4 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.

Software Maintenance
HEXAGON Software is continuously improved and updated. Registered users are regularly kept informed of updates and new editions.

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