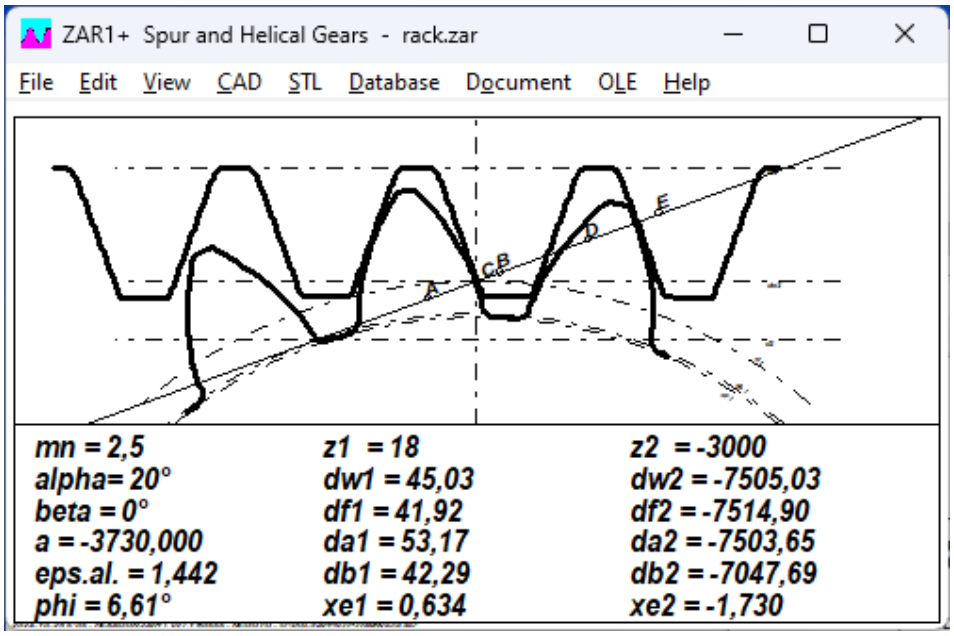
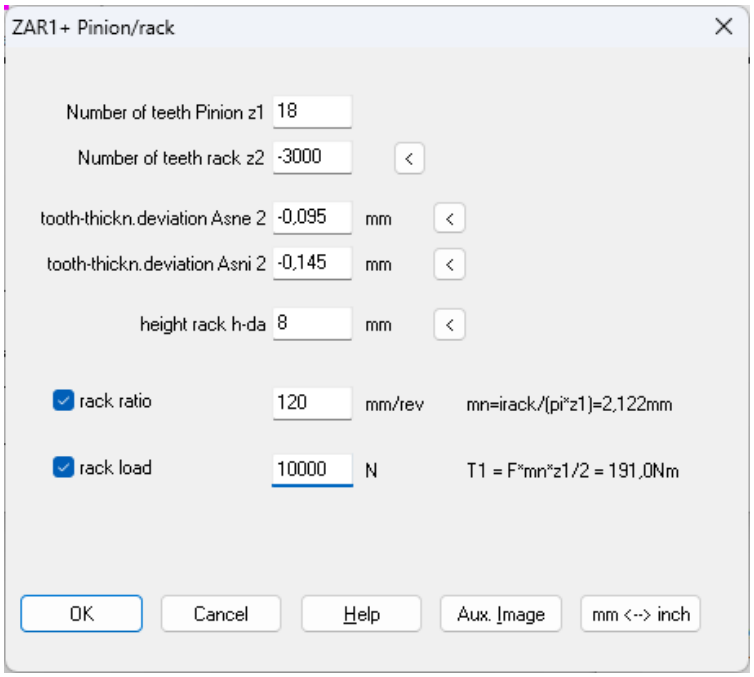
by Fritz Ruoss

ZAR1+: Rack ratio and rack load

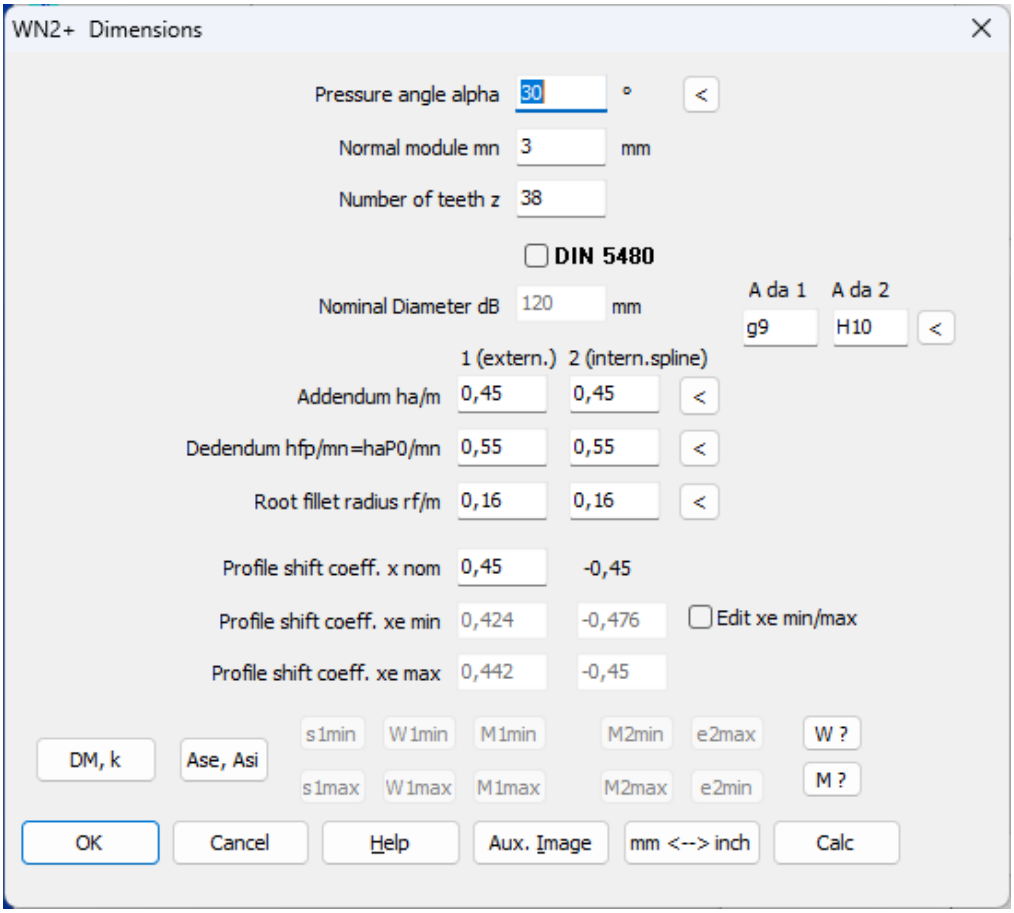


For the rack-pinion calculation, a rack is a gear with an infinite number of teeth. In ZAR1+, it is recommended to use a ring gear with 3000 teeth as the rack (z2= -3000).



In the input window at “Edit\Special dimensions\pinion-rack” you can enter the tooth thickness tolerances and the height of the rack, known from earlier versions.
A new addition is the input of the rack-pinion ratio, which is the stroke of the rack per pinion revolution. This is simply pi*d1 = pi * mn * z1 / cos(ß). If you change the "rack ratio", the normal module is recalculated.
The force on the rack in the direction of movement is similar: pinion torque T1 = F rack * d1 / 2 = F rack * mn * z1 / (2*cos(ß)). If you change the rack force, the pinion torque is adapted.

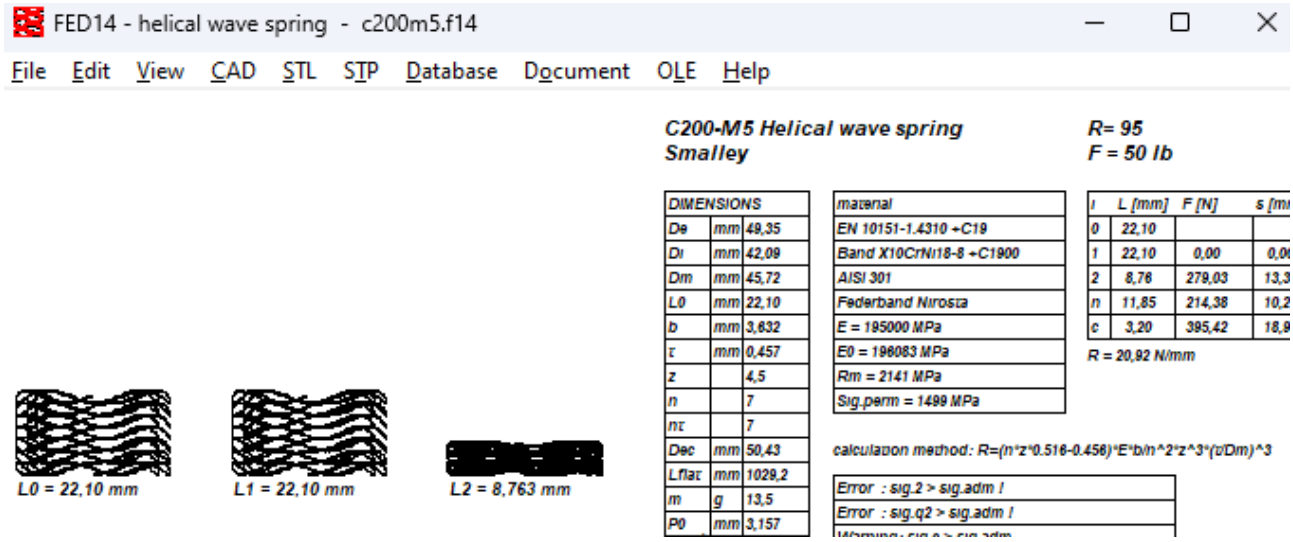
WN2+: Edit ISO tolerance of external diameter
h11 / H11 is the tolerance of the outside diameter of the shaft and hub according to DIN 5480. Normally, this generous tolerance lies within the diameters cut by the gear cutting tool. In WN2+, you can now also enter a different ISO tolerance. "A da1" and "A da 2" under "Edit\Tooth dimensions" if you remove the check mark from "DIN 5480".



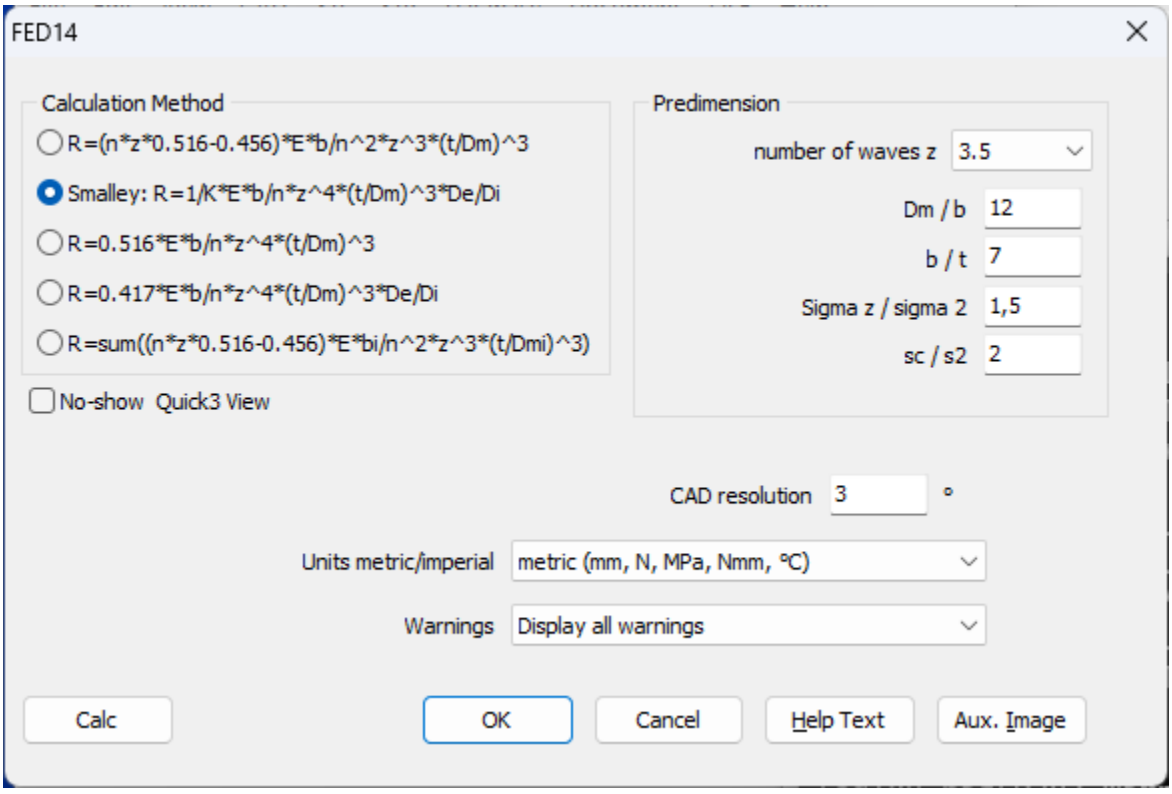
The printout then lists: ISO tolerance, dimensions according to ISO tolerance, largest and smallest outside diameter (xe), which result from tooth height factors, profile shift and tooth thickness tolerance.

Theor.tip diameter	da nom	mm	119,400	114,000
Tolerance da g9/H10	Ada	mm	-0,099	0,140
Tolerance dao g9/H10	Adao	mm	-0,012	0,000
Tip diameter (xemax)	da max	mm	119,352	114,000
Tip diameter (xemin)	da min	mm	119,242	114,156
Tip diameter	da	mm	119,352	-114,070

FED14: Calculation method



Because there is no standard with ready-made formulas for calculating helical wave springs, in 2015, during the development of FED14, experiments were carried out with different formulas for calculating spring forces and spring rates, derived from wave spring washers and girder calculations. The calculation changes for open and closed wave spring washers, depending on the bearing conditions, whether it is clamped firmly on both sides or on one side. The helical wave spring is somewhere in between, and the coil ratio must also be taken into account. In practice, it has been shown that Smalley's formulas usually agree better with the measured values than my own derived formulas. Therefore, the Smalley formulas are now set as the default setting. This calculation method is now set when the program starts.



You can also set the calculation method as the start setting without an update: Save the file with the default settings with the file name “null”. If there is a null file, it will be loaded automatically when the program starts.

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