EUKLID
Solutions for CAD/CAM

5-Axis Milling of Gears – a Technology Update

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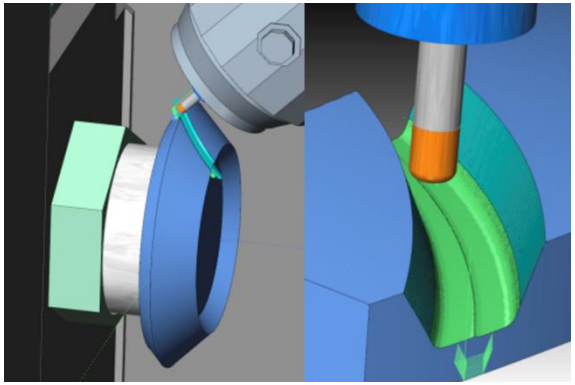
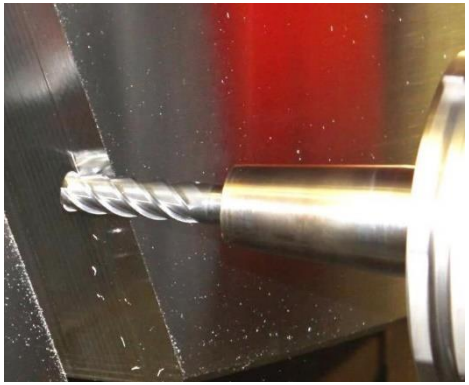
Process Chain 5-Axis Milling of Gears

CAD/CAM

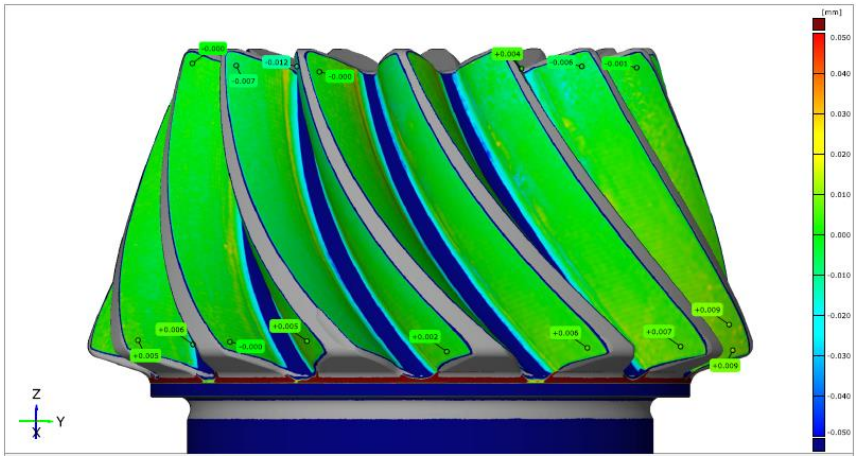


Tool / Process Technology



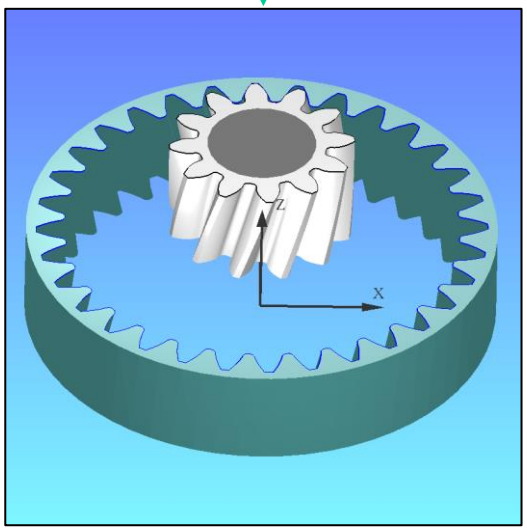
Machine

Quality Management

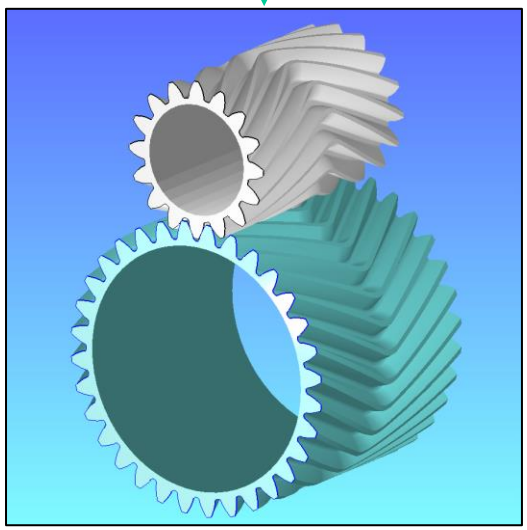


Module Overview

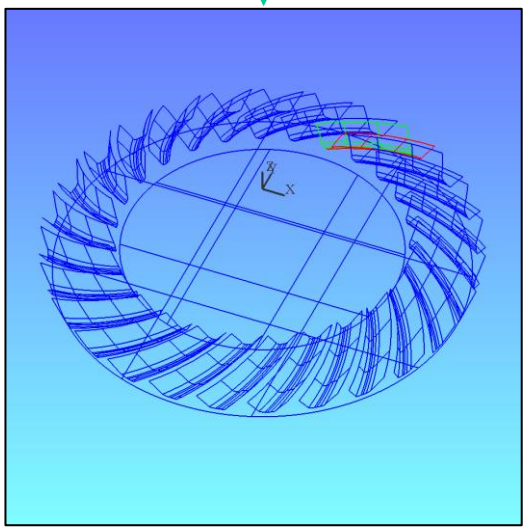
EUKLID GearCAM



Inner Gear
- straight
- helical

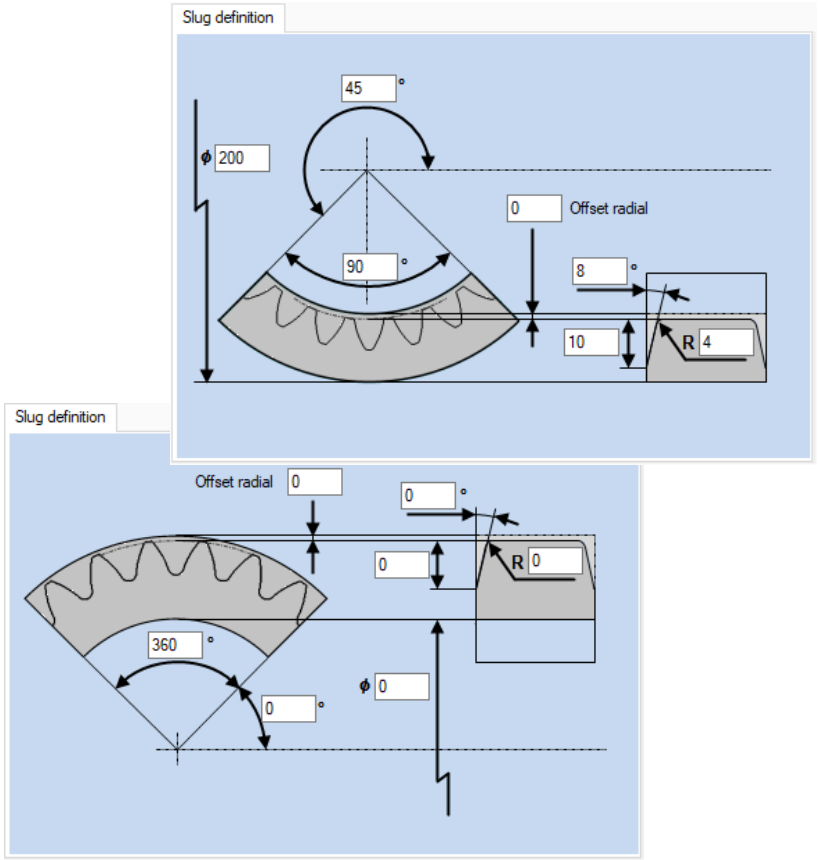


Spur Gear
- straight
- helical
- double helical
- herringbone



Bevel Gear
- straight, helical, spiral
- according to DIN
- Klingelnberg™
- Gleason™

Complex Slug Definition

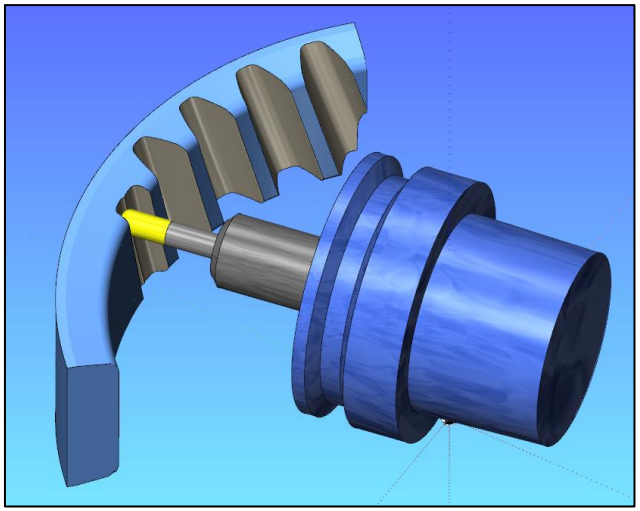


Slug Definition

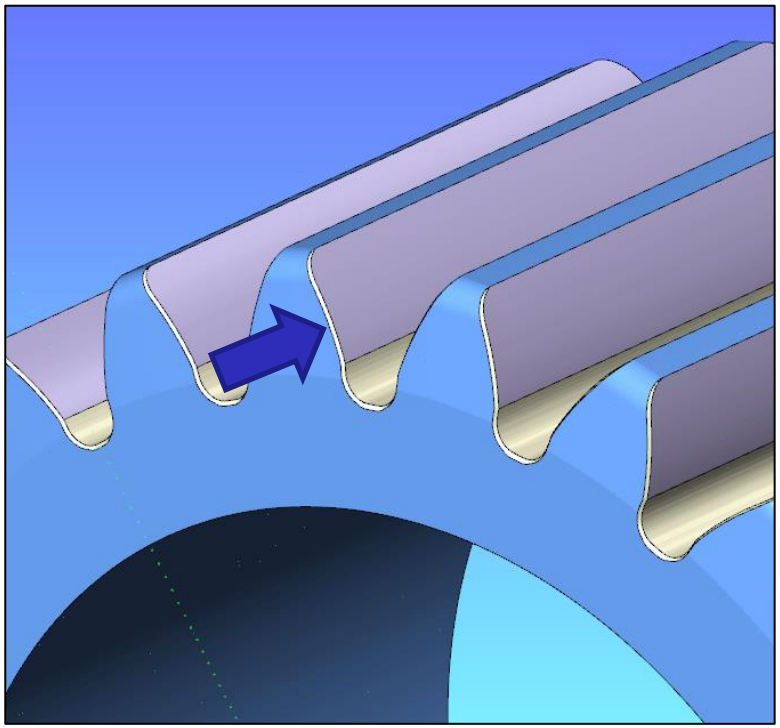
- full diameter
- optional segment (angle range)
- with face chamfer and rounding to inside / outside diameter

Simulation and Processing

- optional selection of the work range

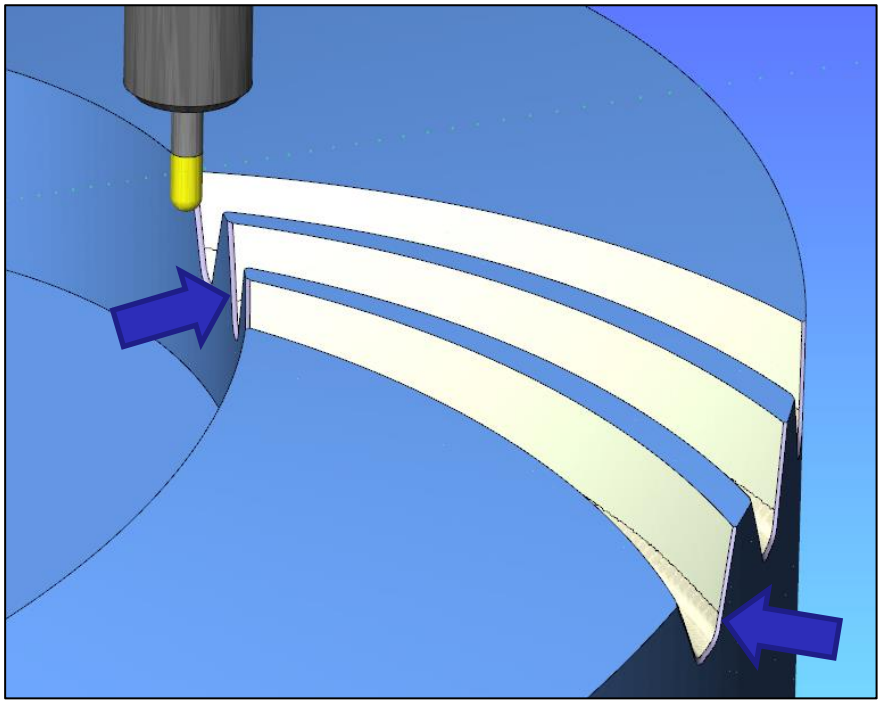


Process Deburring



Deburring Spur Gear

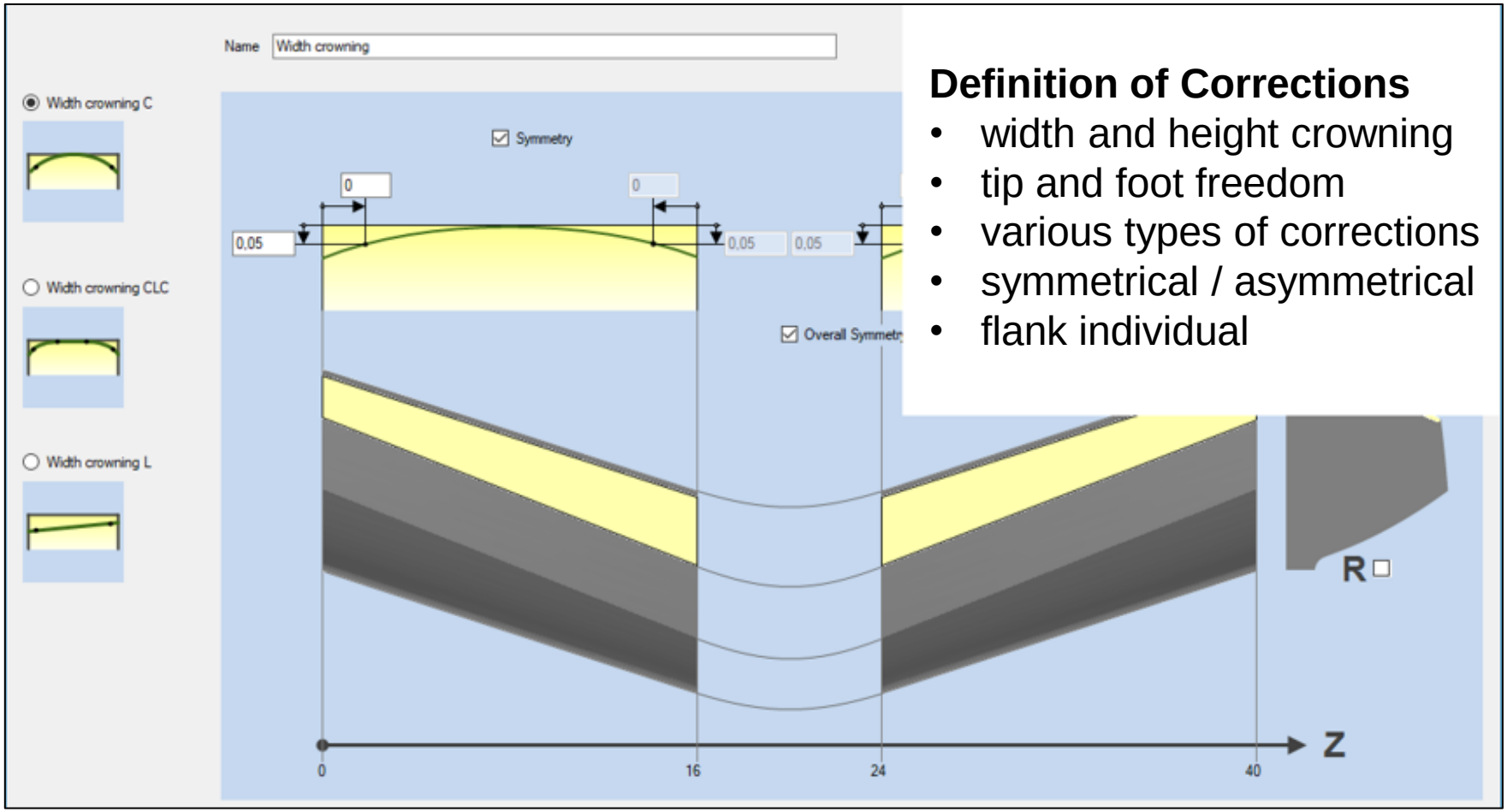
- on all faces
- also for face inclination and radius



Deburring Bevel Gear

- inside
- outside

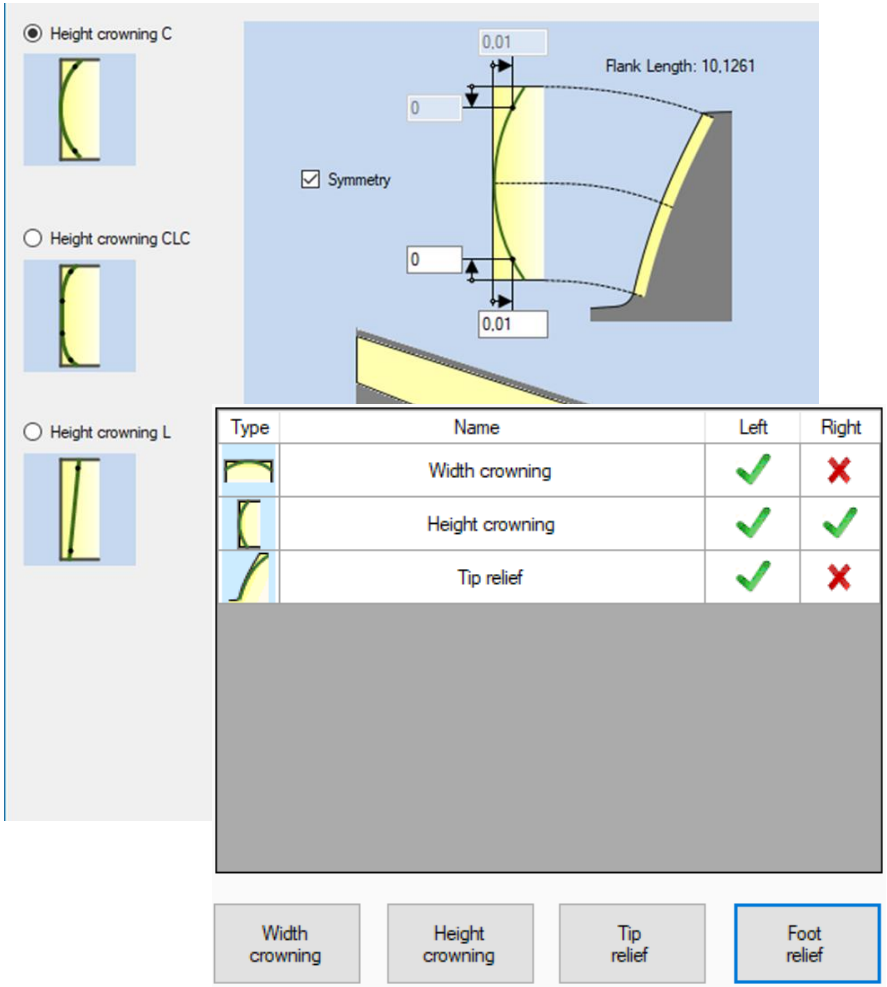
Flank Corrections

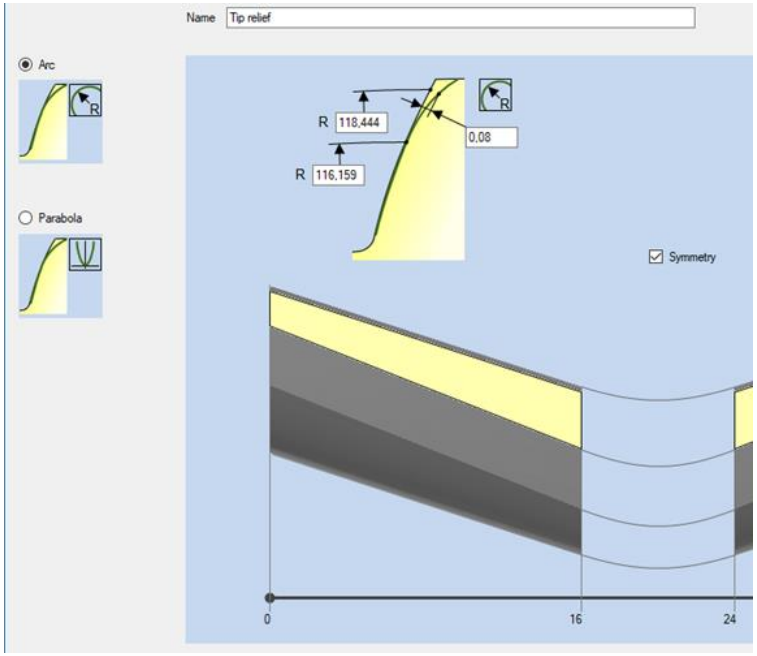


Definition of Corrections

- width and height crowning
- tip and foot freedom
- various types of corrections
- symmetrical / asymmetrical
- flank individual

Flank Corrections

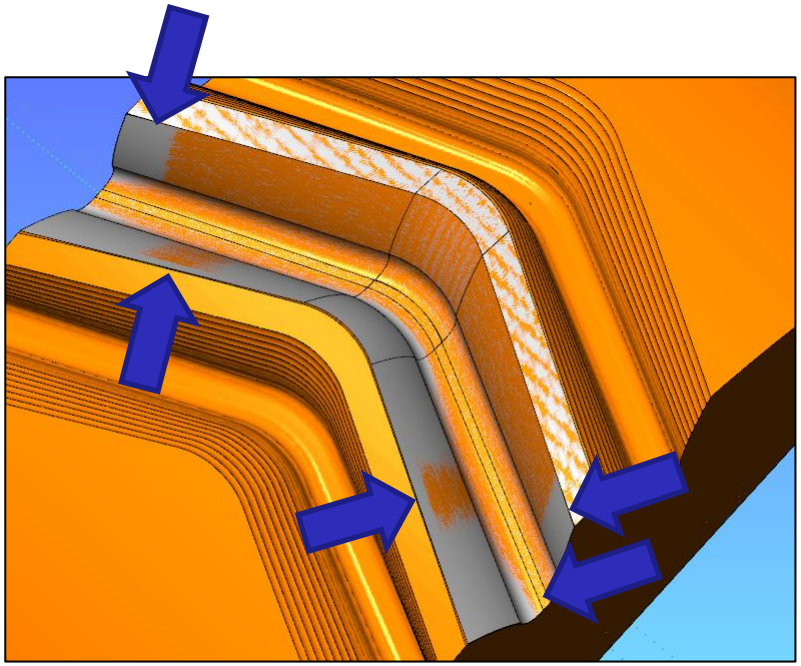




Definition of Corrections

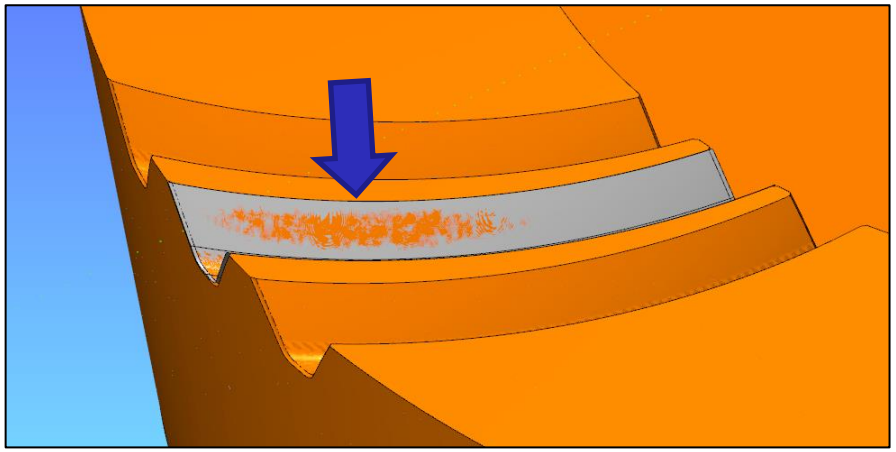
- optional combination and addition of the different corrections

Processing of Gears with Flank Corrections



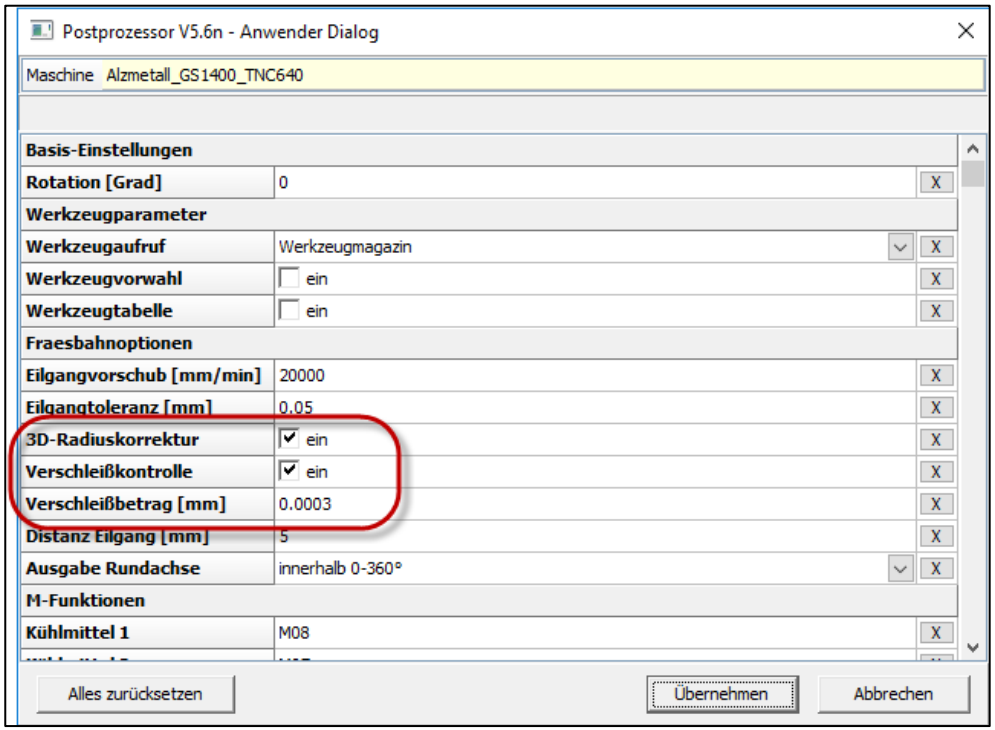
5-Axis-NC-Processing

- absolutely exact addition of all corrections
- optional processing strategy
- incl. correction of the protuberance and foot rounding



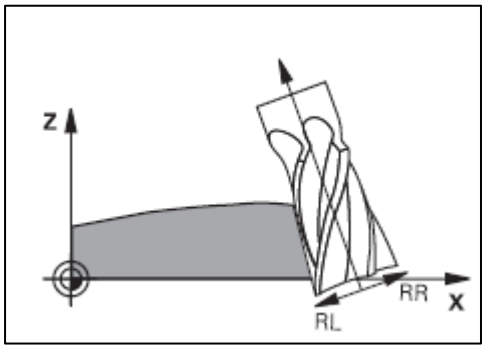
- for all types of spur gears
- for all types of bevel gears

3D-Radius Correction and Wear Adjustment



Postprocessor Options

- output 3D-radius correction
- output wear control
- correction value wear per tooth



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Program Output with Macro Technology and Parametric Technology

Main Program

```
44  * - __OPERATION START__: Roughing_1 -- SECTOR 1
45  M129
46  ;
47  * - TOOL CALL  Name:End_D8_R0.4  T-Nr:20081  ID:20081
48  TOOL CALL 20081 Z S5030
49  M140 MB MAX
50  L X+1200 Y+40 FMAX M91 M31
51  L A+Q20 FQ21
52  M03
53  ;
54  ; FEEDRATE mm/min
55  Q11=1006 ; lead-in feedrate
56  Q12=1006 ; milling feedrate
57  Q13=1006 ; retract feedrate
58  Q14=20000 ; rapid feedrate
59  ;
60  M126
61  Q30=1 ; separates Anfahren A ein
62  ;
63  * - __ job no.001 __ gap no.001 __ Roughing_1
64  Q32=1
65  CALL PGM HERRINGBONE_FINGERTOOLS_CONICAL_M4,6_01_01.H
```

Sub Program

```
0  BEGIN PGM HERRINGBONE_FING MM
1  ; project name : Herringbone-Fingertools-conical-m4,6 / Zahnrad
2  ; PP version   : 5.61
3  ; configuration: Alzmetall_GS1400_TNC640.cfg
4  ; date created : 16.05.2017 - 12:09:00
5  ;
6  ; output measurement unit is: mm
7  ;
8  ;
9  Q33 = Q31 + ( ( Q32 - 1 ) * Q34 )
10  FN 12: IF +Q33 LT +360 GOTO LBL 1
11  Q33 = Q33 - 360
12  LBL 1
13  Q35 = 355.668 + Q33
14  FN 12: IF +Q35 LT +360 GOTO LBL 2
15  Q35 = Q35 - 360
16  LBL 2
17  FN 12: IF +Q30 LT +1 GOTO LBL 3
18  L A-90 C+Q35 FQ21
19  LBL 3
20  L C+Q35 FQ21
21  M72
22  M374
23  ;
24  CYCL DEF 10.0 ROTATION
25  CYCL DEF 10.1 ROT+Q33
26  ;
27  CYCL DEF 32.0 TOLERANZ
28  CYCL DEF 32.1 T0.01
29  CYCL DEF 32.2 HSC-MODE:0 TA1
30  ;
31  M128
32  ;
33  LN X7.7877 Y148.2753 Z46.1076 TX0.0755 TY0.9971 TZ0 FQ14
34  LN X5.4802 Y117.8112 Z46.1076 TX0.0755 TY0.9971 TZ0
```