

**NUM**roto<sup>®</sup>  
*Total solution for tool grinding*

## New features in NUMROTO 4.2.1 and 4.3.0

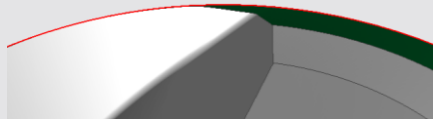
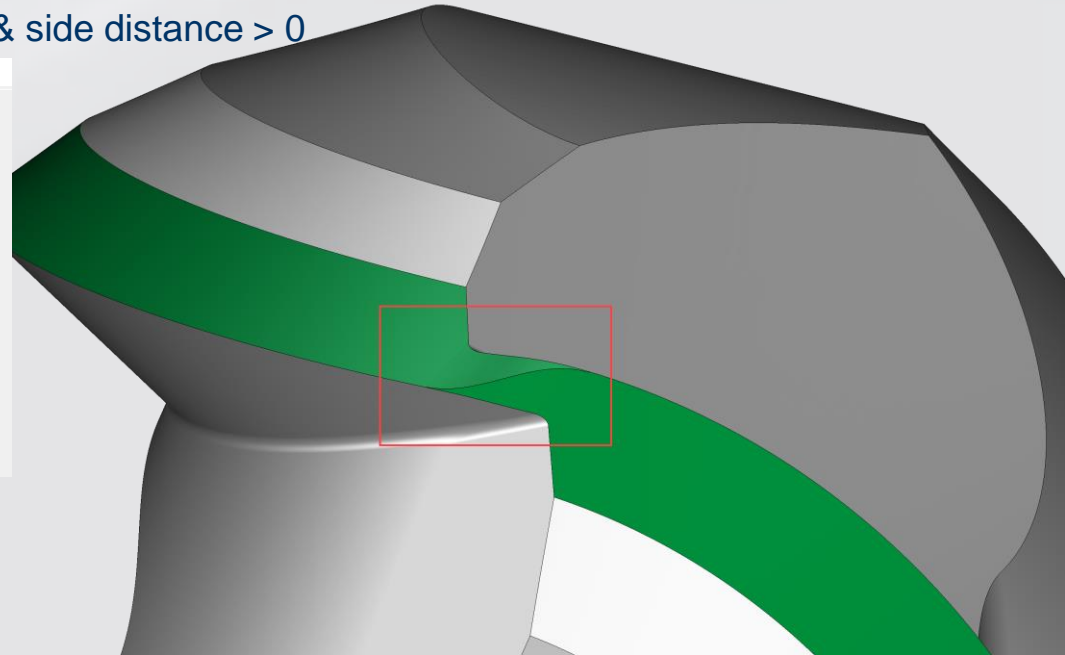
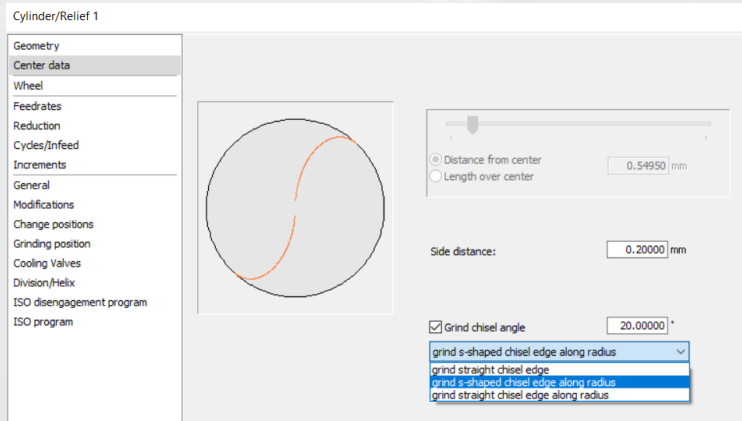
- **End mills**
- Drills / Step drills
- Form cutters
- 3D-Simulation
- NR Draw
- Probing
- NR-Control/NCI
- Other changes
- Additional small improvements



# Cutting edge and chisel edge exactly on radius

(Special grinding functions, 4.3.0)

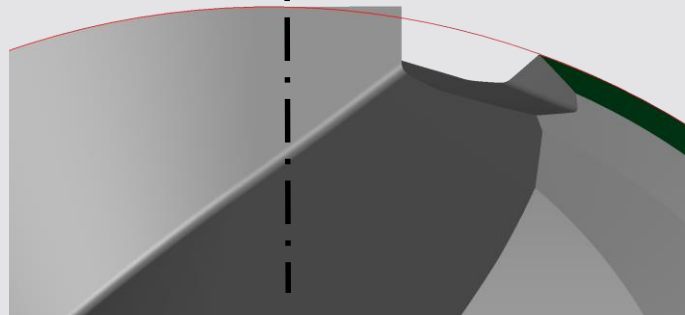
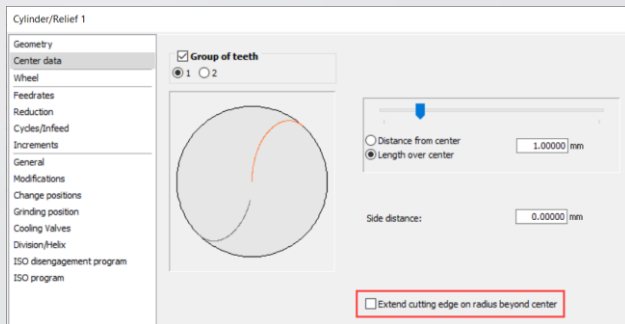
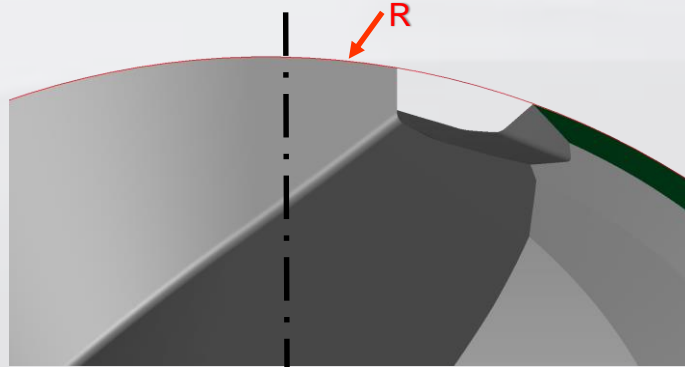
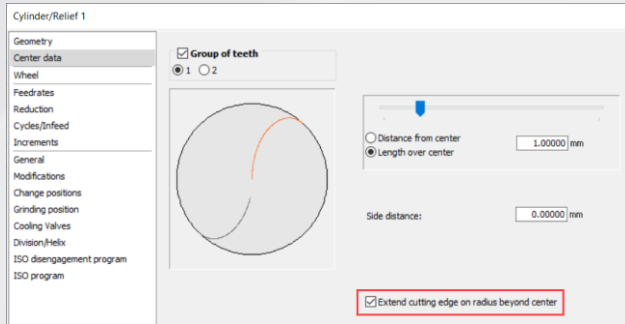
- S-shaped or straight chisel edge which follows the ball nose radius precisely
- Gashout-X and relief are precisely on the ball nose radius cutting edge
- Only for tools with 2 cutting edges to center & side distance > 0



# Grind cutting edge along radius past center

(Special grinding functions, 4.3.0)

## ■ Cutting edge always precisely on radius



# Cup wheel type '11V5'

(Special grinding functions, 4.3.0)

- The type '11V5' can now be used to define a cup wheel.
- The grinding wheel type can so far only be used for end mills.
- The point of grinding is on the inner wheel rim.
- By using the wheel rim on the face of the wheel the tool is pre-grinded automatically.

Type: 11V5

Diameter: 100.00000 mm

Outer corner radius: 0.10000 mm

Inner corner radius: 0.10000 mm

Depth outside: 30.00000 mm

Depth inside: 20.00000 mm

Rim width: 5.00000 mm

External angle: 20.00000°

Internal angle: -15.00000°

Wheel body

A Rim height: 5.00000 mm

Shgw...  
Package...  
Probing...  
Dressing...  
Data interface...



# Flute-X: Show calculated cutting angle

(4.3.0)

- The calculated cutting angle at the front and rear is now being displayed.

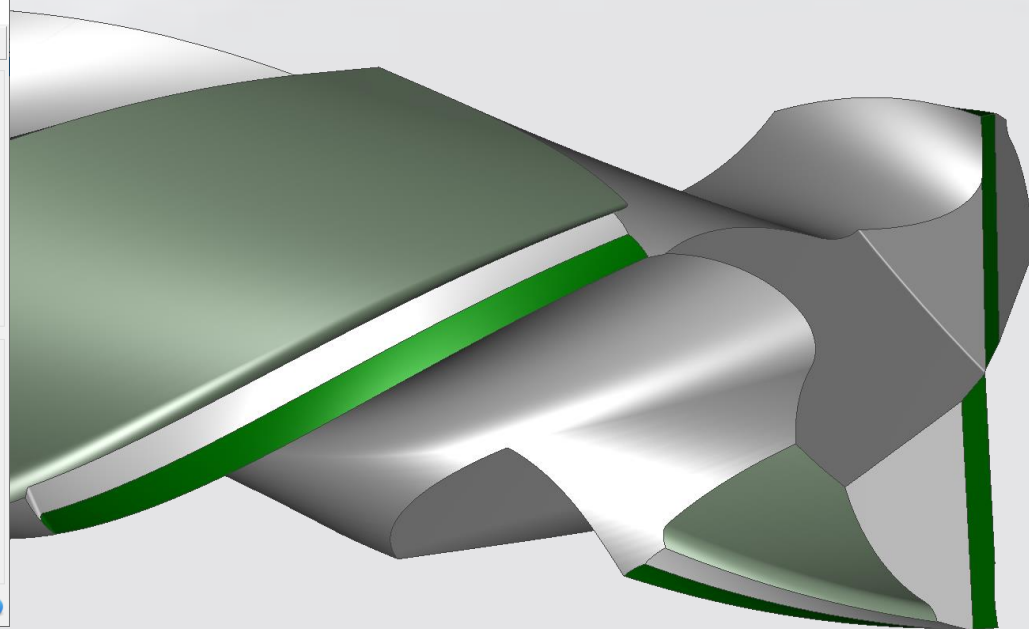
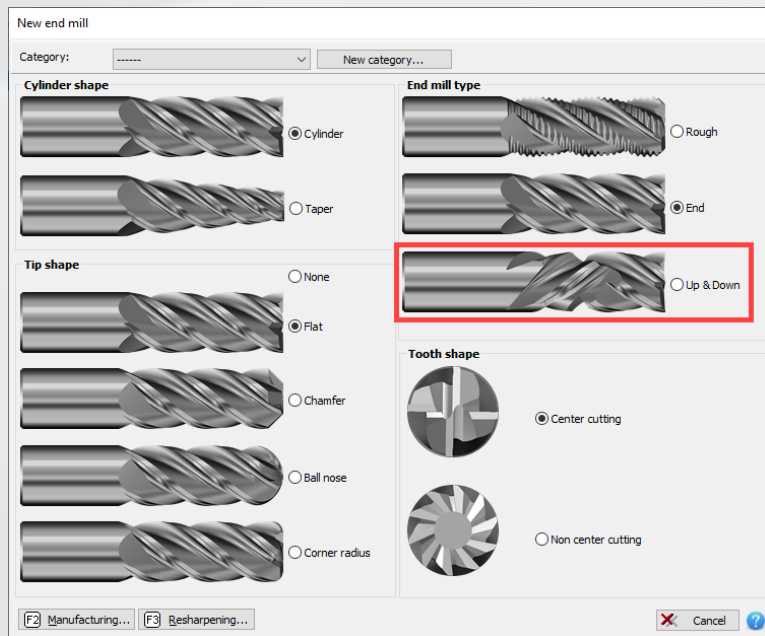
Cylinder/Flute-X

|                                       | Front                              | Rear       |                                       |
|---------------------------------------|------------------------------------|------------|---------------------------------------|
| Rake angle:                           | 0.00000                            | 8.00000 °  | <input checked="" type="checkbox"/> A |
| Measuring depth:                      | 0.25000                            | 0.25000 mm | <input checked="" type="checkbox"/> A |
| Rotation angle:                       | 0.00000                            | 0.00000 °  | <input checked="" type="checkbox"/> A |
| Transv. displacement:                 | 0.00000                            | 0.00000 mm | <input checked="" type="checkbox"/> A |
| Land width correction:                | 0.00000                            | 0.00000 mm | <input checked="" type="checkbox"/> A |
| Length modification:                  | 3.00000 mm                         | 4.50000 mm | <input checked="" type="checkbox"/> A |
| Extension type:                       | Smart                              | Smart      |                                       |
| Flute land width reference:           | According to land width of reliefs |            |                                       |
| Reference relief:                     | 4 Cylinder/Relief 2                |            |                                       |
| Calculation points for flute fitting: | 25% of points                      |            |                                       |
| Consider complete wheel shape:        | Yes                                |            |                                       |
| Cutting angle:                        | Min: 18.22 °      Max: 29.44 °     |            |                                       |

# Up & Down Cutters

(new option, 5.0.0)

- New Cutter type 'Up & Down'

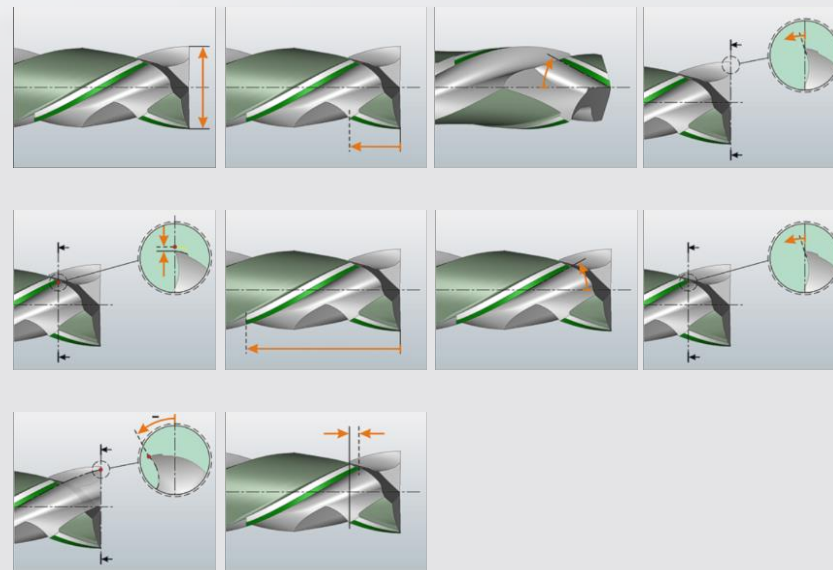


# Up & Down Cutter

(new option, 5.0.0)

- With customized, simple geometry dialogue

| Geometry                      |  |   |  |
|-------------------------------|--|---|--|
| Geometry                      | Number of teeth per helix: <input type="text" value="2"/>  | Number of helices: <input type="text" value="2"/>             |  |
| Blank                         | Center cutting teeth: <input type="text" value="2"/>   | Helix type: <input type="text" value="Constant lead"/>        |  |
| Info                          | Outside diameter: <input type="text" value="16.00000"/> mm   | Cutting direction: <input type="text" value="Right"/>         |  |
| Attachment                    | Taper (Ø): <input type="text" value="0.00000"/> mm/100mm   |   |  |
| Clamping                      |  |   |  |
| Pass over                     |  |   |  |
| Increments                    | Dish angle: <input type="text" value="1.00000"/> °   |   |  |
| CNC                           | Tip rotation angle: <input type="text" value="0.00000"/> °   |   |  |
| 3D                            |  |   |  |
| Park positions                | Defaults: <input type="text" value="Cutting edge length helix 1"/> <input type="text" value="Overlap amount"/> |   |  |
| Probing-General               | <input type="button" value="Update / calculate dependent values"/>   |   |  |
| Probing-Position              |  |   |  |
| Probing-Measuring             |  |   |  |
| Probing-Runout/Lateral runout |  |   |  |
|                               | <b>Helix 1</b>   | <b>Helix 2</b>  |  |
|                               | Cutting edge length: <input type="text" value="10.00000"/> mm  | <input type="text" value="30.00000"/> mm                      |  |
|                               | Cutting angle: <input type="text" value="calculated"/> °   | <input type="text" value="10.00000"/> °                       |  |
|                               | Overlap amount: <input type="text" value="2.00000"/> mm  | Start angle: <input type="text" value="calculated"/> °        |  |
|                               |  | Durchmesserkorrektur: <input type="text" value="0.00000"/> mm |  |
|                               | Helix hand: <input type="text" value="Right"/>   | <input type="text" value="Left"/>                             |  |
|                               | Lead: <input type="text" value="87.06237"/> mm   | <input type="text" value="87.06237"/> mm                      |  |
|                               | Helix angle (cylinder start): <input type="text" value="30.00000"/> °  | <input type="text" value="30.00000"/> °                       |  |
|                               | Rake angle: <input type="text" value="8.00000"/> °   | <input type="text" value="8.00000"/> °                        |  |
|                               | Core diameter: <input type="text" value="8.00000"/> mm   | <input type="text" value="8.00000"/> mm                       |  |





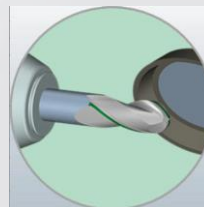
# Selectable grinding position

(4.2.0b)

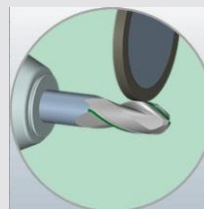
- For reliefs the grinding position is now selectable.

Cylinder/Relief 1

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>Geometry</li> <li>Center data</li> <li>Wheel</li> <li>Feedrates</li> <li>Cycles/Infeed</li> <li>Increments</li> <li>General</li> <li>Change positions</li> <li>Grinding position</li> <li>Cooling Valves</li> <li>Division/Helix</li> <li>ISO disengagement program</li> <li>ISO program</li> </ul> | <p>Machining type:</p> <p><input type="radio"/> 4-axis</p> <p><input checked="" type="radio"/> 5-axis</p> <p>Relief angle: <input type="text" value="12.00000"/> °</p> <p>Land width: <input type="text" value="1.00000"/> mm</p> <p>Width of circular land:</p> <p>Cutting angle: <input type="text" value="35.00000"/> °</p> <p>Displacement angle: <input type="text" value="-35.00000"/> °</p> <p>Grinding point offset: <input type="text" value="0.00000"/> mm</p> <p>Length modification:</p> <p><input type="checkbox"/> Adjust center values according to distance from center</p> <p><b>Eng./diseng. slant</b></p> <p><input type="checkbox"/> Slant      <input type="checkbox"/> Slant</p> <p>Length: <input type="text" value="0.50000"/> mm      <input type="text" value="1.20000"/> mm</p> <p>Angle: <input type="text" value="10.00000"/> °      <input type="text" value="45.00000"/> °</p> <p><b>what should be machined</b></p> <p><input type="radio"/> Face and cylinder</p> <p><input checked="" type="radio"/> only cylinder</p> <p><input type="radio"/> only face</p> <p>Grinding position: <input type="text" value="Tangential"/></p> <p> <input type="button" value="F9"/> <input type="button" value="F10"/> <input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Help"/> </p> |
|--|---|



Grinding position:



Grinding position:

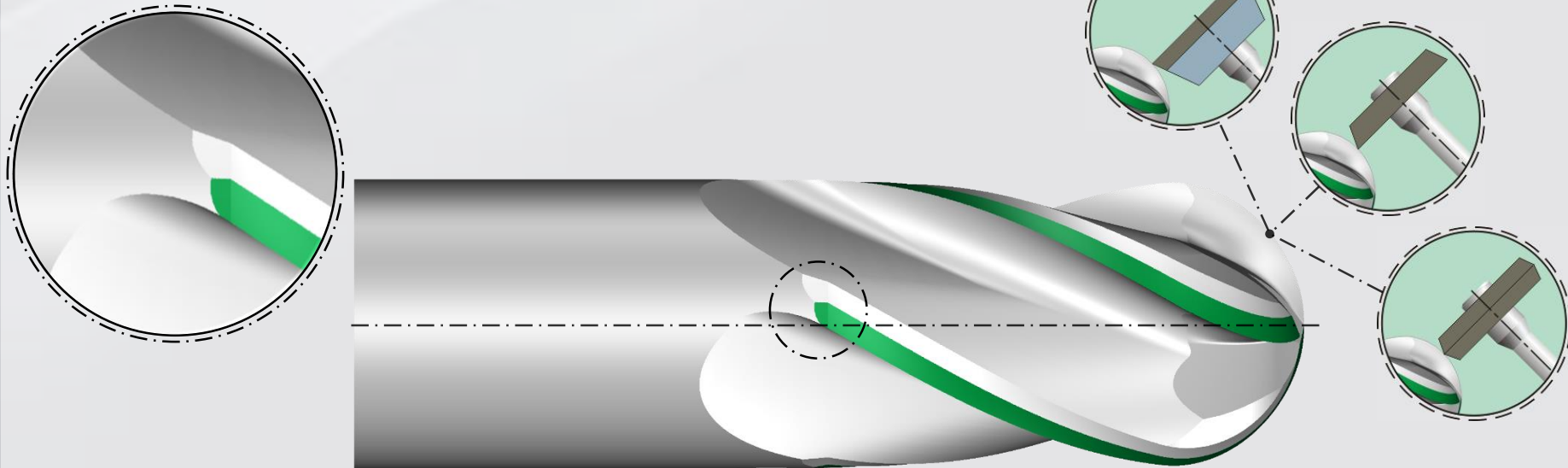


Grinding position:

## Grinding position 'Perpendicular to surface'

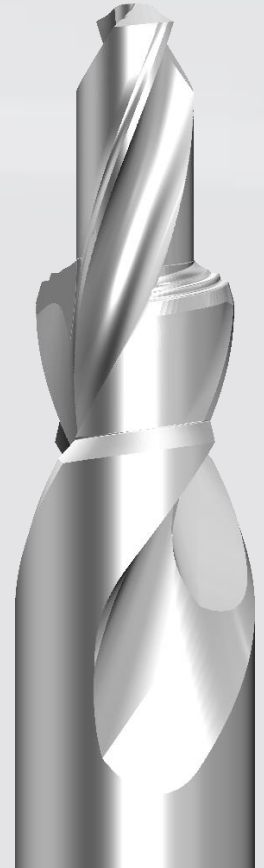
(Special grinding functions, 4.2.0b)

- With cup wheel, peripheral wheel or point wheel.
- Peel grinding with peripheral wheel.  
→ less wheel wear, better looking relief wash out.



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- **Drills / Step drills**
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- Other changes
- Additional small improvements

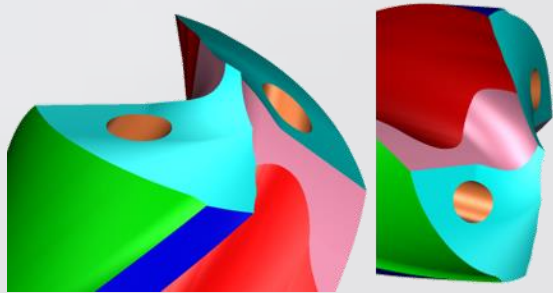


## New Kennametal HP-points 02

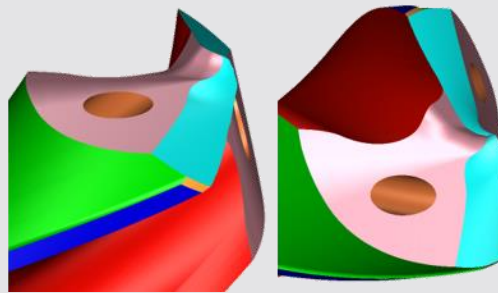
(New option, 4.2.0a)

- The three new drill points SE-111 SGL, SE-112 HPX und SE-113 HPR can now be re-grinded with NUMROTO true to original.
- An official license from Kennametal is needed. The new HP points are not included in the previous HP point.
- NUMROTO order number CH50052491

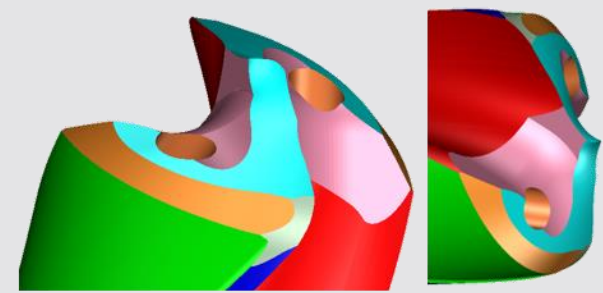
SGL SE-111



HPX SE-112

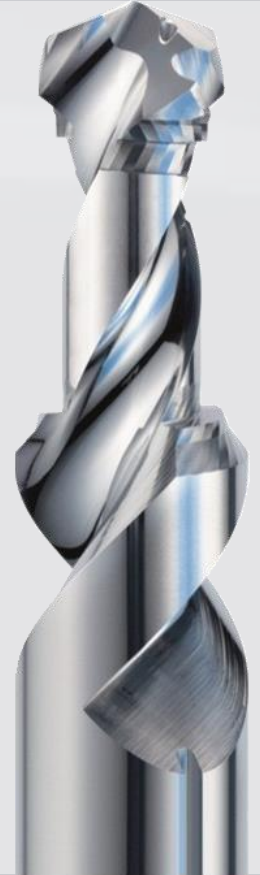


HPR SE-113



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# Show relief profiles

(4.3.0)

- Show relief profile based on the programmed relief angles and land width.

Relief angle definition - Relief angle A

Shape: Form A

Radial normal, axial automatic, dep. on the profile slope  
 Radial normal, axial programmed, independent from the profile slope  
 Relief angle always vertical to surface

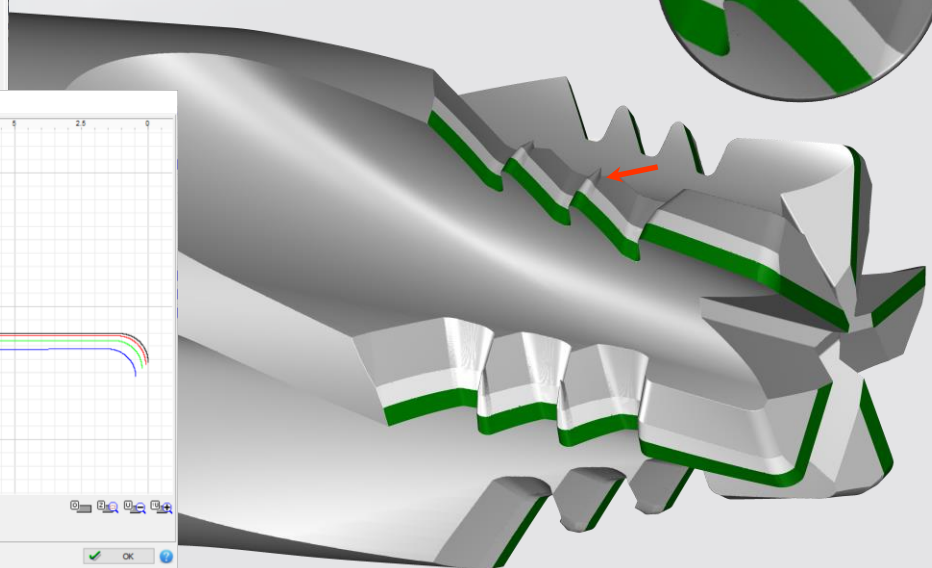
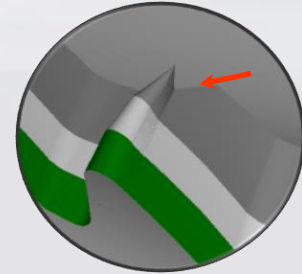
Radial relief angle: 8.00  
Axial relief angle:

Land width: 1.00

Show relief angle profile...

1. relief angle profile  
 2. relief angle profile  
 3. relief angle profile

OK



# Form reliefs: Range relative to profile points

(4.2.0b)

- As reference for the range of a form relief, profile points can now be selected.
- The selected range will now no longer be changed even if some profile elements are modified.

Form A/Form relief 1

Geometry

Range

Oscillate

Division/Disengagement

Wheel

Feedrates

Cycles/Infeed

Increments

General

Reference

Change positions

Grinding position

Cooling Valves

Division/Helix

ISO disengagement program

ISO program

Range measured along profile points

|                       |  |  |   |
|-----------------------|--|--|---|
|                       | Front  | Rear   |   |
| Profile point:        | 9  | 11   | <input type="checkbox"/> A                                  |
| Relative distance:    | 0.00000 mm   | 0.00000 mm                                       | <input type="checkbox"/> Engagement in wheel axis direction |
| Approach angle:       | 45.00000 °   | 90.00000 °                                       |   |
| Engagement length:    | 1.50000 mm   | 1.50000 mm                                       |   |
| Engagement direction: | 90.00000 ° <input type="checkbox"/> A  | calculated <input checked="" type="checkbox"/> A |   |
| Machining direction:  | <input checked="" type="radio"/> from front<br><input type="radio"/> from rear |  |   |

Start and end points     All ranges

Edit profile...

OK     Cancel    ?

# Multi helix

(4.2.0a)

- In form cutters a multi-helix feature has been added. An operation can now follow several helices. This allows to reduce the number of operations for such a tool.

|    |        |                                     |                                     |                                     |                             |
|----|--------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------|
| 12 | Mantel | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Nut / Flute                 |
| 13 | Form A | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | ∅ - Freifläche-2 / Relief-2 |
| 14 | Form A | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | ∅ - Freifläche-1 / Relief-1 |
| 15 | Form A | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Flanken Vorne / Frontside   |
| 16 | Form A | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Flanken Hinten / Backside   |

Cylinder/Flute

Flute

Teeth

Core

Flute washout

Wheel

Feedrates

Reduction

Cycles/Infeed

Increments

General

Change positions

Grinding position

Cooling Valves

Division/Helix

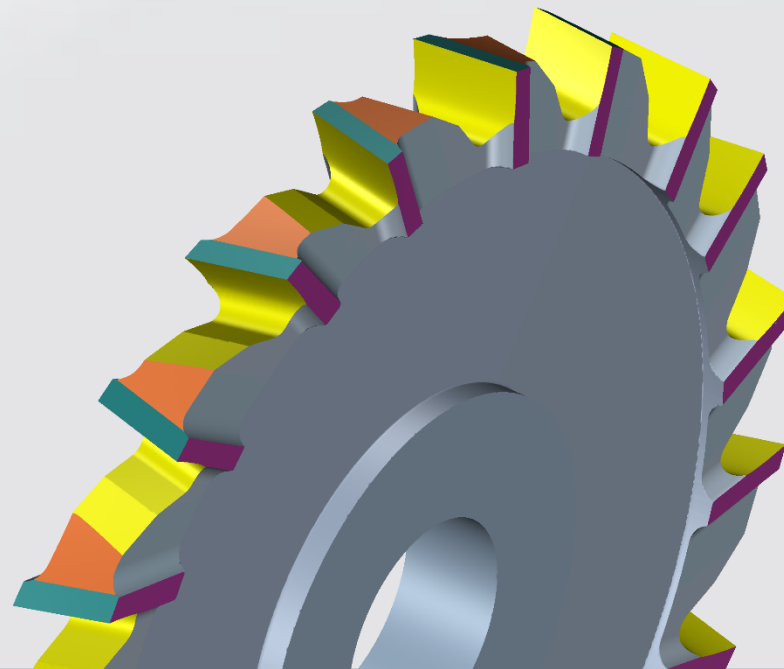
ISO disengagement program

ISO program

Separate division / tooth selection

Start angle 1st tooth:

Used helix:   Helix A  Helix B



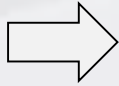


# Multiple form compensation

(new option, 4.1.2)



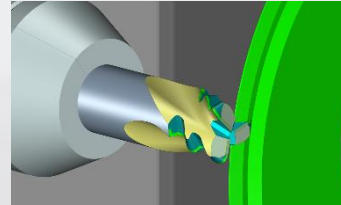
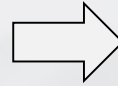
Target profile



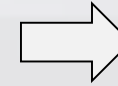
**NUMROTO**  
**Path Calculation**  
**without or with**  
**previous**  
**Compensation Profile**

**Compensation Profile**  
**recalculate**  
**and with this**  
**Calculate new path**

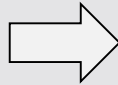
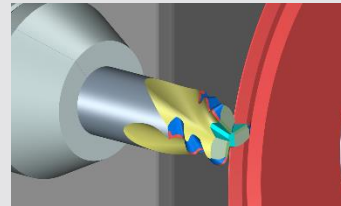
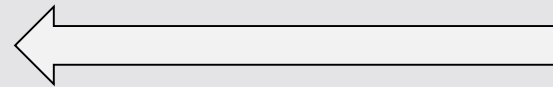
- The calculated compensation profile only shifts the point of contact.
- The grinding wheel is always oriented according to the original target profile.



Grinding



Measuring Tool



Grinding with form compensation

## New features in NUMROTO 4.2.1 and 4.3.0

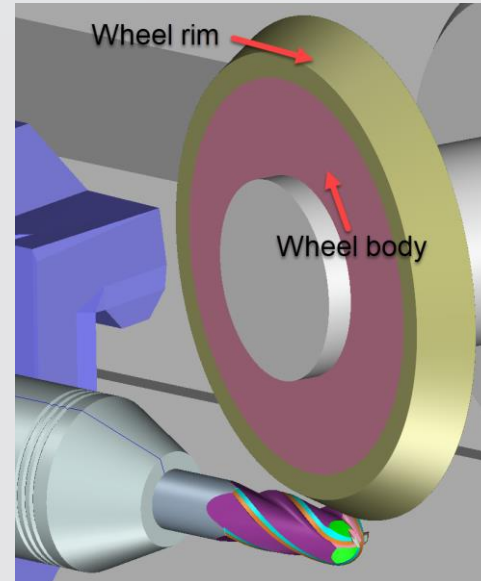
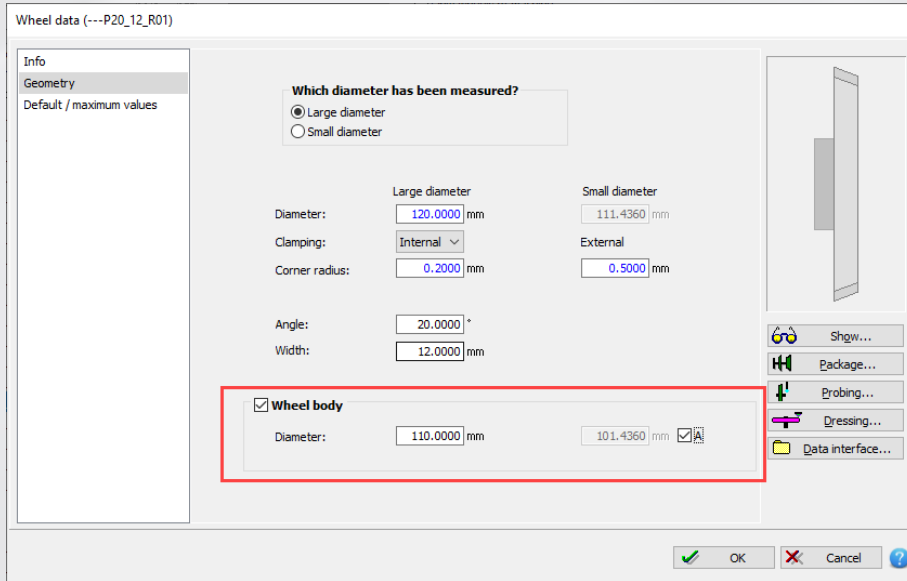
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# Display wheel body

(4.2.1)

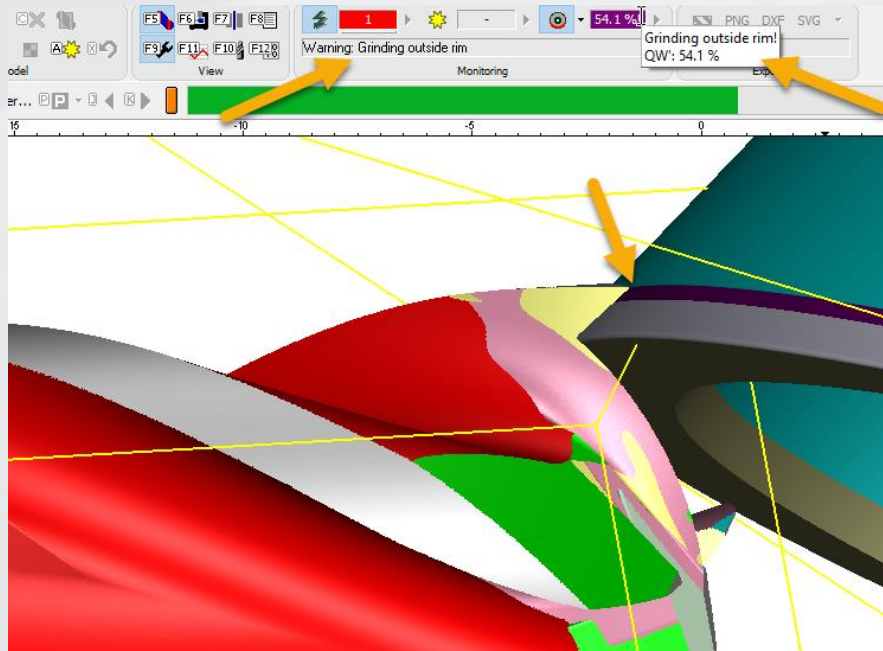
- The size of the wheel body can now be defined. This will also be considered by the 3D collision check and it will be animated in the 3D simulation.



# Monitor wheel body

(4.2.1)

- In the 3D simulation the wheel body will be monitored for collision (only if QW'-calculation is active)

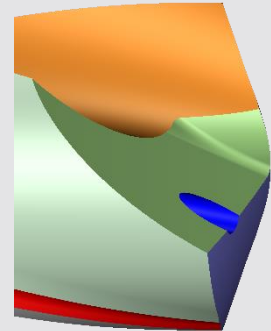
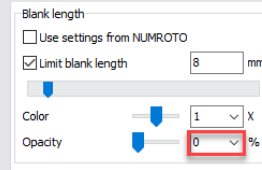
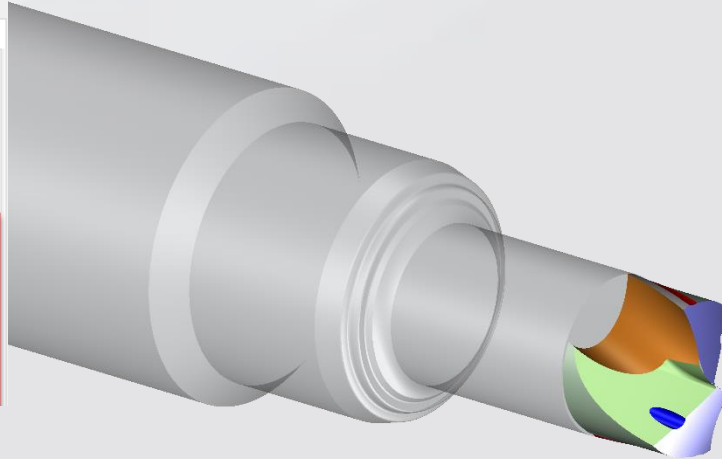
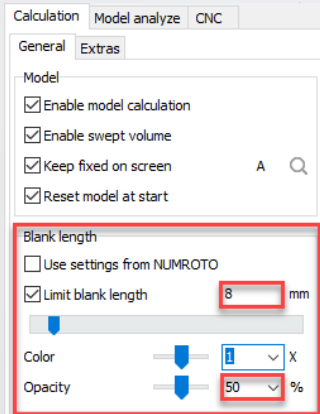


|  | Wheel         | Rotation speed | ID | Feedrate | Collision state | Removal rate | QW'  |
|--|---------------|----------------|----|----------|-----------------|--------------|------|
|  | ---P00_15 (3) | 6684 / 35.00   | 3  | 80.0     | ●               | 882.77       | 4.34 |
|  | ---P00_15     | 6684 / 35.00   | 3  | 30.0     | ●               | 157.33       | 0.64 |
|  | ---P45_08     | 6685 / 35.00   | 1  | 50.0     | ●               | 0.94         | 1.52 |
|  | ---P45_08 (2) | 6684 / 35.00   | 1  | 25.0     | ●               | 8.00         | 1.02 |
|  | ---P45_08 (2) | 6684 / 35.00   | 1  | 30.0     | ●               | 37.52        | 1.26 |
|  | ---T01 (2)    | 6684 / 35.00   | 4  | 5.0      | ⚡               | 47.70        | 4.09 |
|  | ---T01        | 6684 / 35.00   | 4  | 15.0     | ●               | 0.31         | 0.31 |

# Limit blank length / show rear part transparent

(4.2.0b)

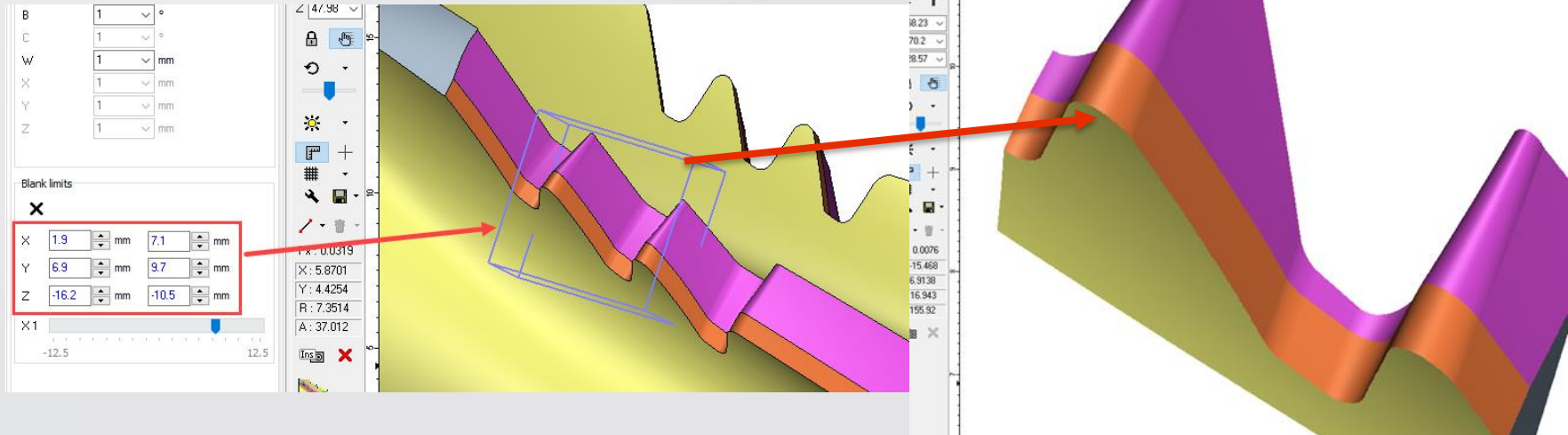
- The blank can now also be shortened directly in NUMROTO-3D. Also the opacity for the in-active blank part can be set.
- The minimal opacity for the rear part for a blank with a limited length can now also be set to 0%, so that the rear part is completely invisible (like in earlier versions).



# Reduce the blank to a cuboid

(4.3.0)

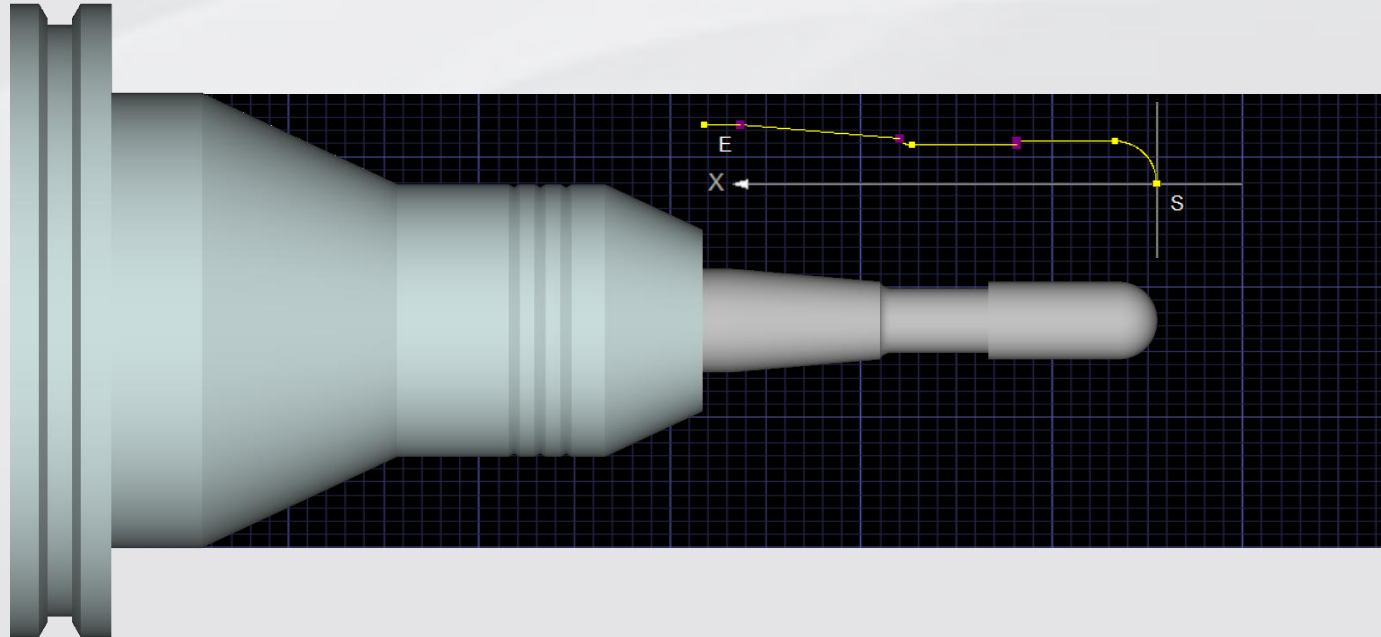
- Possibility to reduce the blank to a defined cuboid to get a highly accurate simulation of small details.



# DXF blank

(4.2.0a)

- The blank for the 3D simulation can now also be defined by a 2D profile.



3D stock amount:  mm  A  
 Simulate shortening for resharpener  
 Stock amount on diamet...  mm  
 Blank:    
 Limit blank length

Blank  Collet

Circular orientation:

Settings for 3D collision detection...

Simulate only one tooth  
 Suppress reverse finishing  
 Use real CNC-file  
 Use grinding program splitting  
 Simulate cyclic grinding  
 Simulate oscillation

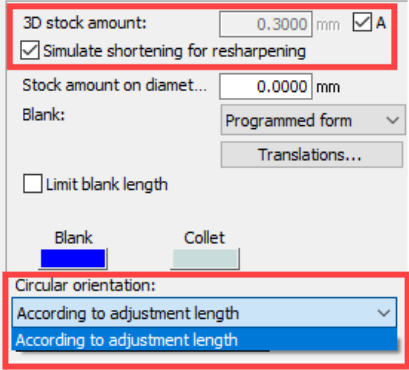
Add missing packages autom.  
 Flange distance:  mm  
 Use un-assigned packages on spindle 1

Bild 1 von 6  
 Grösse: 486 KB

# Simulate shortening (Production and re-grinding)

(4.2.0a)

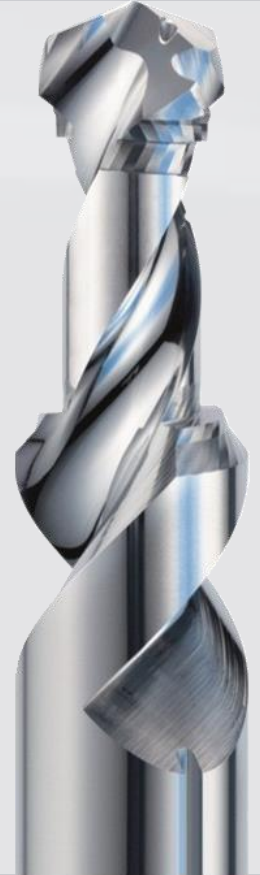
- Instead of the „end stock amount“ a shortening amount can be set for the 3D-simulation. This shortening amount can be linked with the shortening amount from the page ‚Manufacturing‘ or ‚Resharpending‘. This allows to recognize collisions with the collet more accurately and also has other advantages. For example for the collision check the same shortening amount will now be used as for the actual grinding.
- For the 3D simulation the effect of the shortening amount is now the same as when the tool is actually shortened on the grinding machine. Thus the shortening of pre-fluted blanks or the resharping of cross-toothed or conical tools can be simulated exactly. When this new function has been activated, the circular orientation can only be set to ‚According adjustment length‘.

A screenshot of a software interface for 3D simulation settings. The interface is divided into several sections. The top section, highlighted with a red border, contains a text input field for '3D stock amount' set to '0.3000 mm' with a checkmark and the letter 'A' to its right. Below this is a checked checkbox labeled 'Simulate shortening for resharpening'. The middle section contains a text input field for 'Stock amount on diamet...' set to '0.0000 mm', a dropdown menu for 'Blank:' set to 'Programmed form', and a button labeled 'Translations...'. Below the dropdown menu is an unchecked checkbox labeled 'Limit blank length'. The bottom section, also highlighted with a red border, contains a dropdown menu for 'Circular orientation:' with two options: 'According to adjustment length' (selected) and 'According to adjustment length' (unselected). At the bottom of the interface, there are two buttons labeled 'Blank' and 'Collet', with the 'Blank' button highlighted in blue.



## New features in NUMROTO 4.2.1 and 4.3.0

- End mills
- Drills / Step drills
- Form cutters
- 3D-Simulation
- **NR Draw**
- Probing
- NR-Control/NCI
- Other changes
- Additional small improvements



# User defined drawing headers and tool parameters

(4.2.0)

**Drawing header company**

| Profilname | Abmessung          | Allgemeinabmessung nach DIN ISO 2788-1 | Werkstoff | Rohmühle |
|------------|--------------------|--|-----------|----------|
|            | 50 x 3             | 40.1                                   | HM        |          |
|            | 50 x 3             | 40.1                                   |           |          |
|            | 3 bis 6            | 40.1                                   |           |          |
|            | 6 bis 30           | 40.2                                   |           |          |
|            | 30 bis 100         | 40.3                                   |           |          |
|            | 100 bis 400        | 40.5                                   |           |          |
|            | 400 bis 1000       | 40.8                                   |           |          |
|            | über 1000 bis 3000 | 41.2                                   |           |          |

**Drawing header adapted in NR-Draw**

NUMROTO-Draw 2.2.0x Build 1548 - [...] - NR\_Draw\_FORM

Cell - Text dialog box:

- Main: NUMROTO data
- Source type: NUMROTO data
- Category:
  - General
  - Blank
  - Geometry
  - Program options
  - Client details
- Item:
  - Tool material
  - Coolant hole

Properties panel:

Customer table

| Profilname | Abmessung          | Allgemeinabmessung nach DIN ISO 2788-1 | Werkstoff | Rohmühle |
|------------|--------------------|--|-----------|----------|
|            | 50 x 3             | 40.1                                   | Carbide   |          |
|            | 50 x 3             | 40.1                                   |           |          |
|            | 3 bis 6            | 40.1                                   |           |          |
|            | 6 bis 30           | 40.2                                   |           |          |
|            | 30 bis 100         | 40.3                                   |           |          |
|            | 100 bis 400        | 40.5                                   |           |          |
|            | 400 bis 1000       | 40.8                                   |           |          |
|            | über 1000 bis 3000 | 41.2                                   |           |          |

## New features in NUMROTO 4.2.1 and 4.3.0

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# Probing: Helix hand detection

(since version 4.2.0b)

- When using the function ,Helix hand detection' the search angle can now be defined separately.

Geometry

Forms  
Relief  
Helix  
Tip  
Blank  
Info  
Attachment  
Clamping  
Clamping system transformatio.  
Pass over  
Increments

Displacement for probing position in X: 40.0000 | mm Y: 0.0000 | mm  A  
Measuring depth in X: 0.6000 | mm  
Alignment: On cutting edge

Helix hand detection  
Find right helix  Search angle: 18.0000  A  
None   
Find right helix   
Find left helix

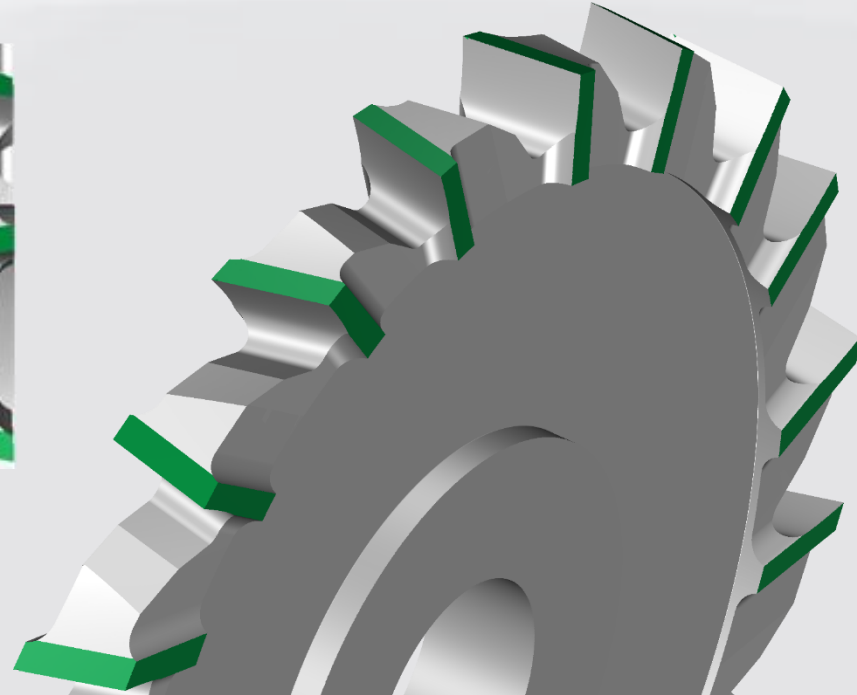
**Monitor clamping length modification**  
 To the front  To the end

Geometry

Forms  
Relief  
Helix  
Tip  
Blank

List of helices

|         | Geometry | Note               |
|---------|----------|--------------------|
| Helix A | ...      | Helix hand - Right |
| Helix B | ...      | Helix hand - Left  |



## New features in NUMROTO 4.2.1 and 4.3.0

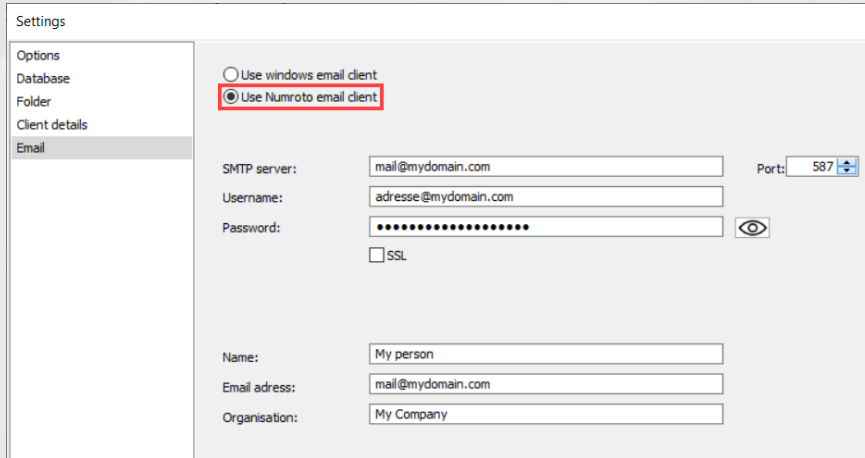
- End mills
- Drills / Step drills
- Form cutters
- 3D-Simulation
- NR Draw
- Probing
- **NR-Control/NCI**
- Other changes
- Additional small improvements



# Numroto E-Mail Client

(4.3.0)

- It is no longer necessary to install an e-mail program to send notifications with NR-Control - an integrated e-mail client for sending e-mails is now available.



The screenshot shows the 'Settings' window for the Numroto E-Mail Client. On the left is a sidebar with a tree view containing 'Options', 'Database', 'Folder', 'Client details', and 'Email' (which is selected). The main area contains the following settings:

- Two radio buttons at the top: 'Use windows email client' (unselected) and 'Use Numroto email client' (selected and highlighted with a red box).
- 'SMTP server': mail@mydomain.com
- 'Port': 587 (dropdown menu)
- 'Username': adresse@mydomain.com
- 'Password': masked with dots, with an eye icon to toggle visibility.
- 'SSL': unchecked checkbox.
- 'Name': My person
- 'Email adress': mail@mydomain.com
- 'Organisation': My Company

## New features in NUMROTO 4.2.1 and 4.3.0

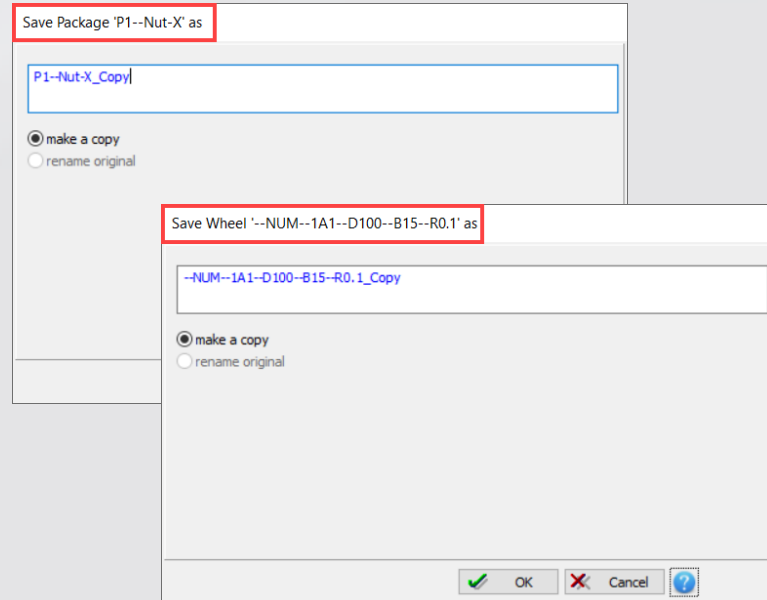
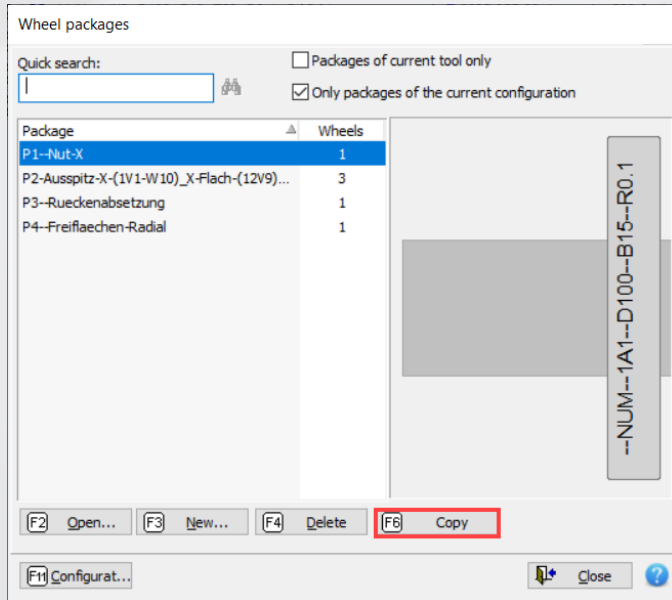
- End mills
- Drills / Step drills
- Form cutters
- 3D-Simulation
- NR Draw
- Probing
- NR-Control/NCI
- **Other changes**
- Additional small improvements



# Copy wheel packages

(4.3.0)

- Existing wheel packages can now be copied. The package and the wheels are automatically duplicated during this process. The names for the new package and the copied wheels can be selected individually.

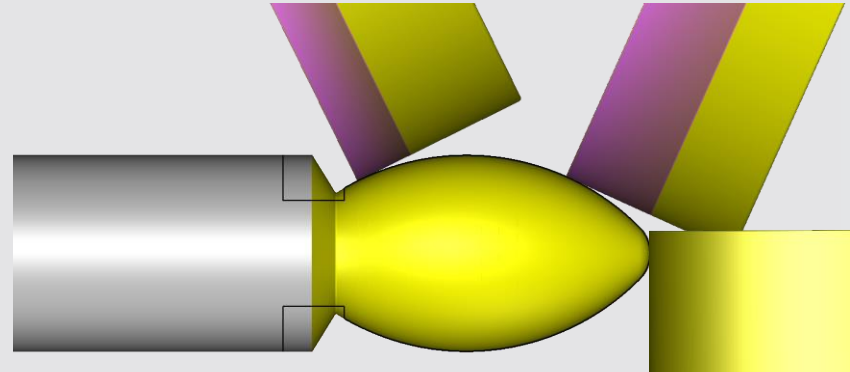
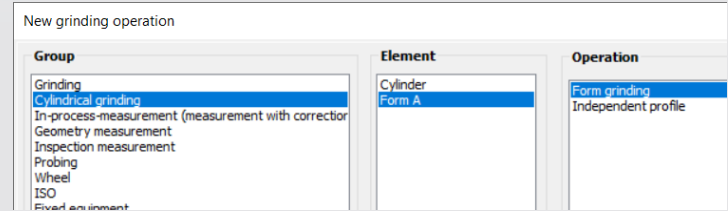
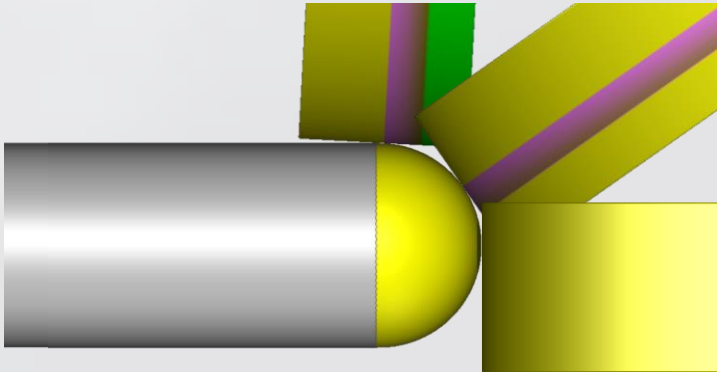
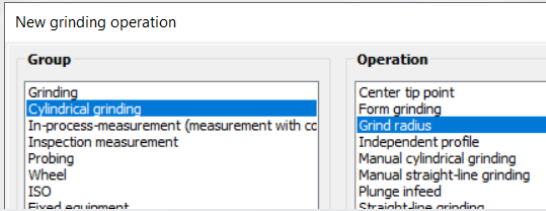




# Cylindrical grinding perpendicular to the radius or profile

(4.3.0)

- End mills: new operation 'Radius grinding' (Cylindrical grinding perpendicular to ball nose radius)
- Form cutters: new operation 'Form grinding' (Cylindrical grinding perpendicular to profile)



# Plunging between end of cutting edge and shank

(4.3.0)

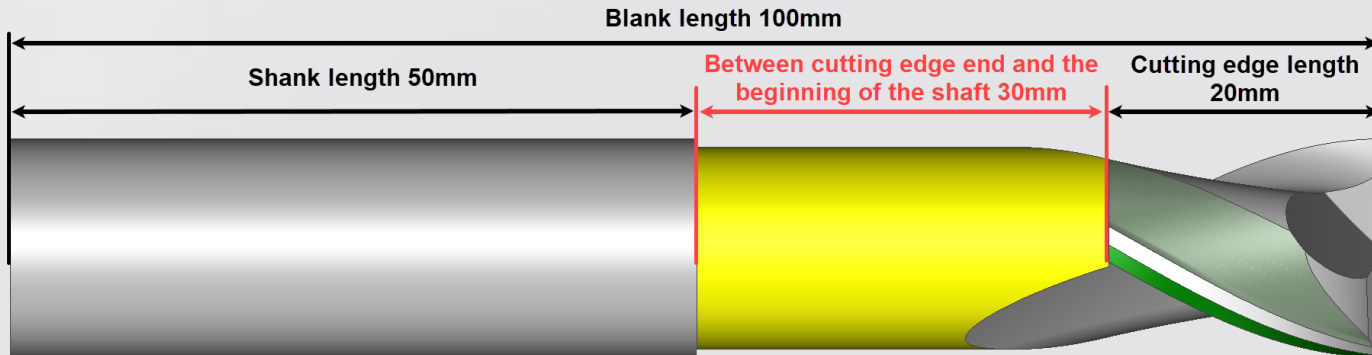
- With the operation 'Cylindrical grinding – Plunge infeed' it is now possible to grind automatically between end of cutting edge and shank.

**Blank**

|              |                       |                      |                                       |
|--------------|-----------------------|----------------------|---------------------------------------|
| Length:      | Blank<br>100.00000 mm | Shank<br>50.00000 mm | <input type="checkbox"/> A            |
| Diameter:    | 15.00000 mm           | 16.00000 mm          | <input checked="" type="checkbox"/> A |
| Point angle: | 180.00000 °           |                      | <input type="checkbox"/> A            |

CG Cylinder/Plunge infeed

|                   |  |               |
|-------------------|--|---------------|
| Geometry          | <b>Section</b>   |               |
| Range / Direction | Front position   | Rear position |
| Wheel             |  |               |
| Feedrates         |  |               |
| Cycles/Infeed     |  |               |
| Tool spindle      |  |               |
| AC                |  |               |
| General           | Length modification: -17.00000 mm 30.00000 mm  |               |
| Modifications     | <input checked="" type="checkbox"/> Plunge infeed between cutting edge end and shaft |               |
|                   | <input checked="" type="checkbox"/> Limitation: 17.00000 mm                          |               |



# ISO-Program: Machine independent movements

(4.2.1)

- Instead of an ISO disengagement program the movements can now also be defined in a machine independent table.
- Like this the user-defined disengagement moves create exactly the same results on all machines, independent from the axis names.

Cylinder/Grind tap

Geometry

Wheel

Feedrates

Cycles/Infeed

AC

General

Change positions


Grinding position

Cooling Valves

Division/Helix

ISO disengagement program

ISO program


 Execute ISO program during disengagement:

**Programm Definition**

Name:

maschinenunabhängige Verfahrssätze Verfahrssätze...

ISO Verfahrssätze

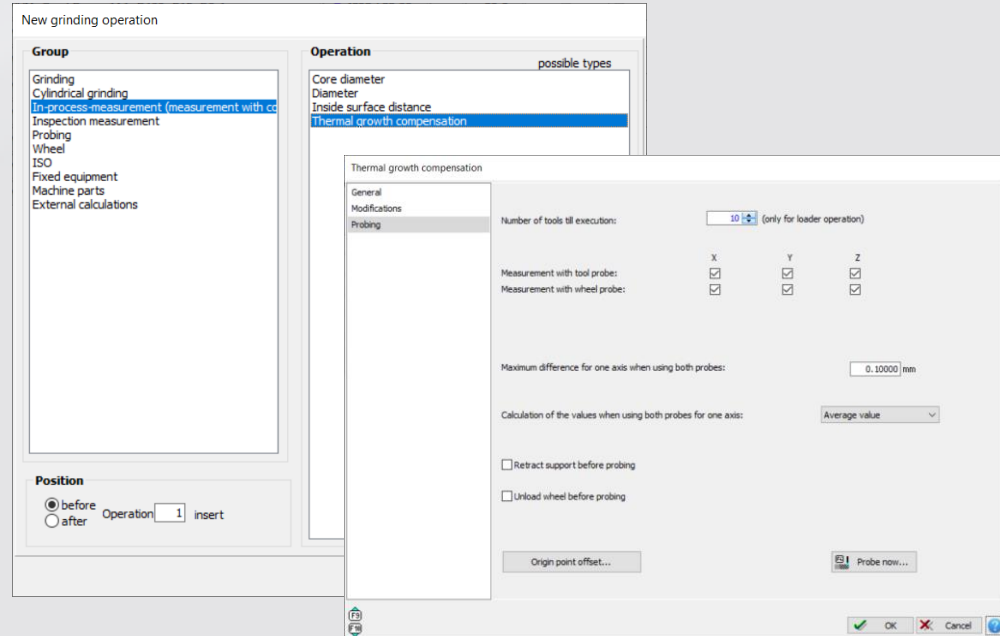
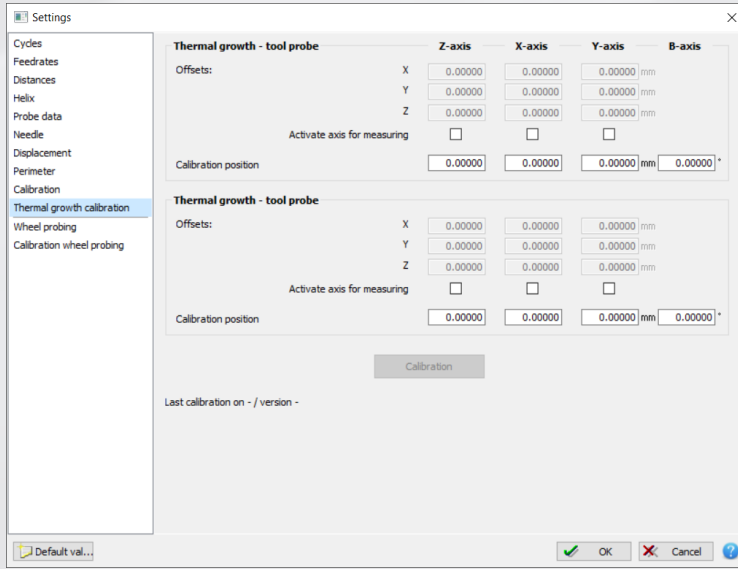
List of points

|   | Length  | Vertical | Cross  | Torsion | V-Factor | Feedrate |
|---|---------|----------|--------|---------|----------|----------|
| 1 | 1.0000  | 2.0000   | 0.0000 | 3.0000  |          |          |
| 2 | 20.0000 | 3.0000   | 0.0000 | 4.0000  | 1.000    | 3000.0   |

# Thermal growth compensation, new option

(4.3.0)

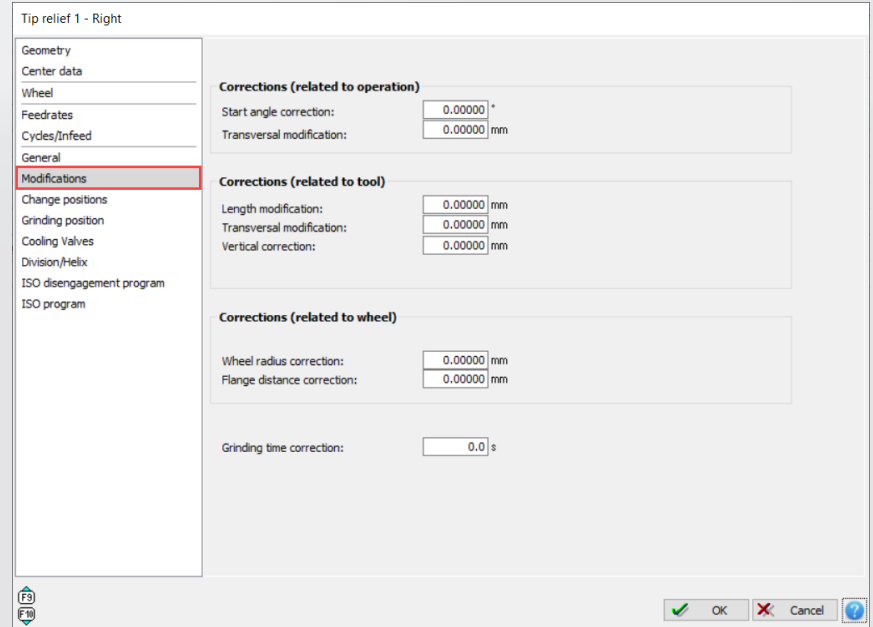
- Automatic thermal growth compensation using the work piece or wheel probe
- This function must be adapted once for each machine kinematic



# Dialogue with corrections

(4.3.0)

- The same corrections can now be used for practically every operation. The list of possible corrections has been greatly expanded. (Related to operation, work piece or wheel).
- Important: These corrections should only be used with small values. With larger values, geometry deviations may occur and collisions cannot be ruled out.



## New features in NUMROTO 4.2.1 and 4.3.0

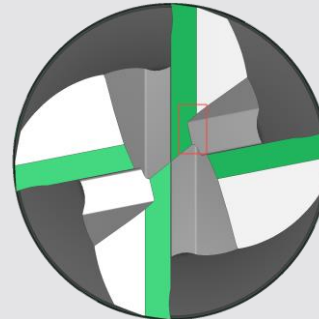
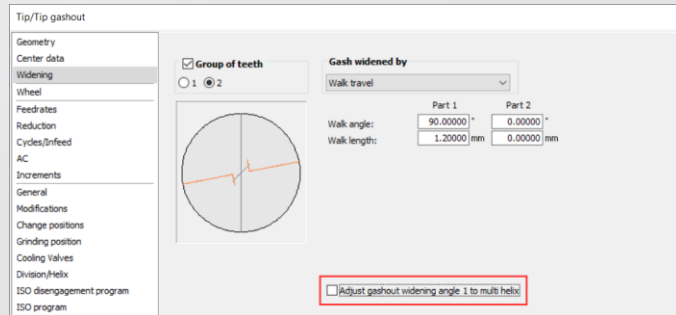
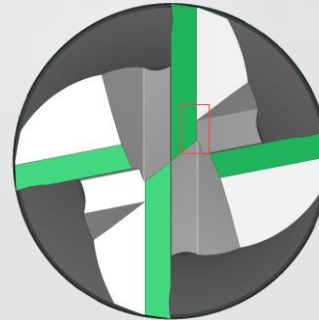
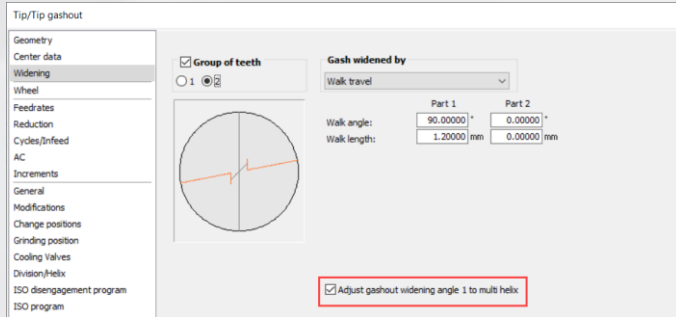
- End mills
- Drills / Step drills
- Form cutters
- 3D-Simulation
- NR Draw
- Probing
- NR-Control/NCI
- Other changes
- **Additional small improvements**



## Adjusting the walk angle for multi-helix-cutter

(4.2.1g)

- With multi-helix-cutters, the pitch angle on the tip is often unequal. During gash out, this leads to the walk angles no longer fitting optimally during widening. This can now be adjusted automatically.



# Numroto-3D: Monitor QW'

(3D Special functions, 4.2.1)

- Numroto-3D can now monitor the QW' maximum during collision detection. For the QW' maximum to be calculated accurately, a higher model resolution is required (at least 200).

3D

- Calculate and take into account 3D-model when doing the collision check
- Additionally monitor removal rate during the 3D collision check
- Monitor QW' during collision detection

Model resolution:

|   | Operation               | Wheel  | Rotation speed | ID | Feedrate | Collision state | Removal r... | QW'  |
|---|-------------------------|--|----------------|----|----------|-----------------|--------------|------|
| 1 | Cylin... Flute-X        | NUM--1A1-D100-B15-R0.1                         | 3438 / 18.00   | 1  | 80.0     | ●               | 1352.5       | 7.13 |
| 2 | Tip Tip clearance       | NUM--1A1-D100-B15-R0.1                         | 5730 / 30.00   | 1  | 50.0     | ●               | 91.09        | 0.66 |
| 3 | Tip Tip gash out X      | NUM--1V1-D100-B12-R0.1-W10-Innen               | 5730 / 30.00   | 2  | 50.0     | ●               | 82.68        | 1.95 |
| 4 | Tip Tip gash out X flat | NUM--12V9-D100-B20-R0.1-Innen                  | 5730 / 30.00   | 2  | 50.0     | ●               | 24.02        | 0.67 |
| 5 | Cylin... Relief 2       | NUM--Typ-11V5-D100-B10-T30-R0.1-W15-Schlichten | 5730 / 30.00   | 2  | 15.0     | ●               | 23.00        | 0.88 |
| 6 | Cylin... Relief 1       | NUM--Typ-11V5-D100-B10-T30-R0.1-W15-Schlichten | 5730 / 30.00   | 2  | 15.0     | ●               | 9.94         | 0.82 |

Program check (Collision, Removal rate, QW', Path error)

| N | Operation           | State            | Removal rate - mm3/min | QW' - mm3/s/mm | Path error - μm |
|---|---------------------|------------------|------------------------|----------------|-----------------|
| 1 | FLUTE-X             | ✖ QW' - Overload | 1351.91                | 7.03           | 0.00            |
| 2 | TIP CLEARANCE       | ● No collision   | 91.09                  | 0.65           | 0.00            |
| 3 | TIP GASH OUT X      | ● No collision   | 81.98                  | 1.81           | 0.30            |
| 4 | TIP GASH OUT X FLAT | ● No collision   | 24.61                  | 0.65           | 0.00            |
| 5 | RELIEF 2            | ● No collision   | 18.74                  | 0.75           | 0.76            |
| 6 | RELIEF 1            | ● No collision   | 5.96                   | 0.54           | 0.84            |

NUMROTO-3D collision detection

QW' was exceeded at one or more grinding operations! Should the CNC file still be sent to the machine?

Yes  No



# Numroto-3D: Shorten blank length for collision check

(4.2.1)

- The blank length is now automatically shortened for the collision check. The length always corresponds to the part that sticks out from the collet. This achieves better accuracy for the material removal rate and QW calculation.

Geometry

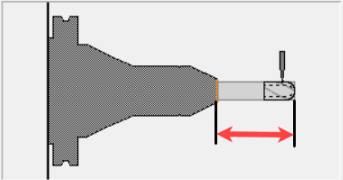
Cylinder geometry  
Teeth  
Blank  
Info  
Attachment  
Clamping  
Pass over  
Increments  
CNC  
3D  
Park positions  
Probing-General  
Probing-Position  
Probing-Measuring  
Probing-Runout/Lateral runout

**Clamping**  
Clamping length:  mm  
 Measured from the collet  
 Separate distance for measuring the clamping length  
Stick in depth:  mm

**Collet**  
pre-defined (settings)  [Settings...](#)  
110.0x15.0  
 Check collision

**Setup**  
Tool start angle:  °  
Adjustment length:  mm  A

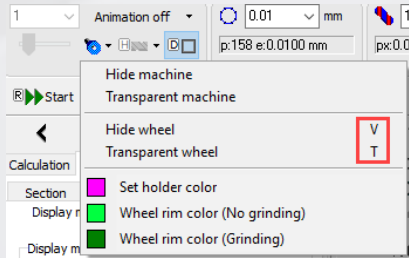
Gripping position:  mm



# Numroto-3D: Hide wheel / transparent wheel

(4.2.1)

- There are two new keyboard shortcuts to change the transparency of the wheel or to hide it. So far these functions could only be accessed by using the tool bar. These shortcuts work in both directions.



# Numroto-3D: Show path error only when > 0

(4.2.1)

- The path error is now only displayed if it is > 0.  
This makes it clear in which operations the path error could be significant at all.

|   | O        | 3D Co...                            | Operation                           | Wheel               | Rotation speed   | ID           | Feedrate | Collision state | Removal rate | QW     | Path error | Change positions | Flags |  |
|---|----------|-------------------------------------|-------------------------------------|---------------------|--|--------------|----------|-----------------|--------------|--------|------------|------------------|-------|--|
| 1 | Cylin... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Flute               | --NUM--1A1--D100--B15--R0.1                            | 3438 / 18.00 | 1        | 80.0            |              | 605.73 | 3.53       | n/a              |       |  |
| 2 | Tip      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Tip clearance       | --NUM--1A1--D100--B15--R0.1                            | 5730 / 30.00 | 1        | 50.0            |              | 83.76  | 0.84       | n/a              |       |  |
| 3 | Tip      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Tip gash out X      | --NUM--1V1--D100--B12--R0.1--W10--Innen                | 5730 / 30.00 | 2        | 50.0            |              | 74.42  | 1.75       | 0.303            |       |  |
| 4 | Tip      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Tip gash out X flat | --NUM--12V9--D100--B20--R0.1--Innen                    | 5730 / 30.00 | 2        | 50.0            |              | 21.68  | 0.67       | 0.001            |       |  |
| 5 | Cylin... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Relief 2            | --NUM--Typ-11V5--D100--B10--T30--R0.1--W15--Schlichten | 5730 / 30.00 | 2        | 15.0            |              | 47.98  | 1.98       | 0.760            |       |  |
| 6 | Cylin... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Relief 1            | --NUM--Typ-11V5--D100--B10--T30--R0.1--W15--Schlichten | 5730 / 30.00 | 2        | 15.0            |              | 5.96   | 0.52       | 0.839            |       |  |

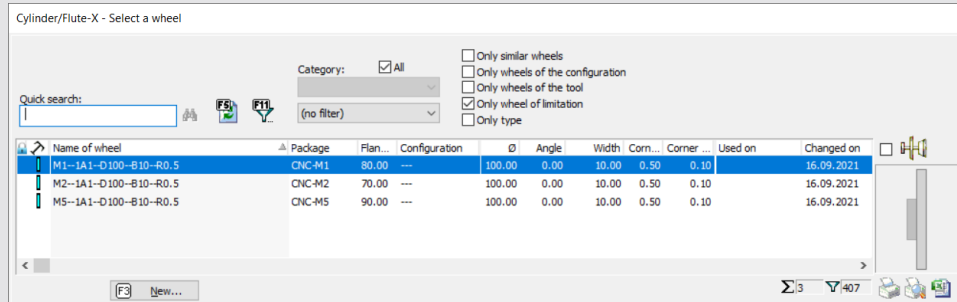
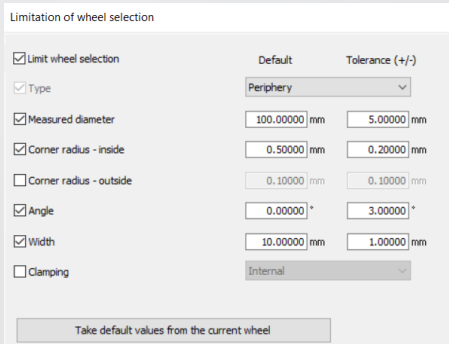
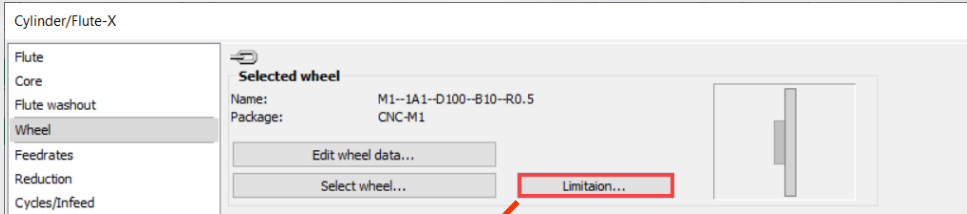
## Other optimizations in 3D simulation

- Up to 15% faster simulation when using a CPU with 6 or more cores (4.3.0)
- Avoiding the overlapping of the measurement results display (4.2.1)
- STL blanks can now also be limited in length (4.2.1)

## Limit wheel selection

(4.2.1)

- The wheel selection can now be individually limited per operation based on various criteria. This is helpful if other wheels are to be assigned to the tool on another machine. This information is retained even if the target assignment has been deleted.



# Scaling: Several improvements

(since version 4.2.0b)

- Scaling of end-mills and drills has been improved in many ways, so that after changing the diameter of an existing tools not many manual adjustments will be needed.
- In the settings it is now also possible to define how the constant lead should be changed if a tool is being scaled based on a diameter change.

Default values - General

- Basic data
- Clamping
- Pass over
- Increments
- CNC
- 3D
- ISO programs
- Technology
- Park positions
- Cooling Valves
- Templates
- Machine specific data

Recalculate values for diameter variations from:  %

**Reliefs**

Machining:  4-axis  5-axis

Sequence:

**Tip**

Dish angle:  °

Displacement angle:  °

Gash outs - adjust gash out widening radius to wheel cornerradius

**Diameter definition for production**

Ball nose tip:  Corner radius tip:

**Flute depth definition**

Manufacturing:  Resharpener:

Use shank values DIN 6535

Behavior of the constant lead when scaling:

# Tool- and grinding wheel filter



(4.3.0)

- The filter which was selected previously will now be opened directly by using the button 

Tool list

Quick search:

Category:  All

  Standard  All tool types  Only tools of current machine

| Name       | Ø     | No. of flutes | Number of use: | Changed on | Revision | Grinding time | Weight | Category | Note |
|------------|-------|---------------|----------------|------------|----------|---------------|--------|----------|------|
| Eckfase-T2 | 16.00 | 2             | 0              | 06.09.2021 |          | 0.0s          | 0      |          |      |










Show image

Filter



Filter name:

At least one of the following conditions must be complied  
 All of the following conditions must be complied

**Filter conditions**

|  |                             |                                     |                                      |
|--|-----------------------------|-------------------------------------|--------------------------------------|
|  Diameter                       | is between                  | <input type="text" value="0.0"/> mm | <input type="text" value="20.0"/> mm |
|  No. of flutes                  | equals                      | <input type="text" value="2"/>      |                                      |
|  Tip shape                      | corresponds to a value from | Flat with corner chamfer            |                                      |
|  Cylinder shape                 | corresponds to a value from | Cylinder                            |                                      |
|  End mill type                  | corresponds to a value from | End mill                            |                                      |
|  Number of helices              | equals                      | <input type="text" value="1"/>      |                                      |
|  Number of center cutting edges | equals                      | <input type="text" value="2"/>      |                                      |
|  Tool material                  | corresponds to a value from | Carbide                             |                                      |
|  Helix twist                    | corresponds to a value from | Constant lead                       |                                      |

Please select...

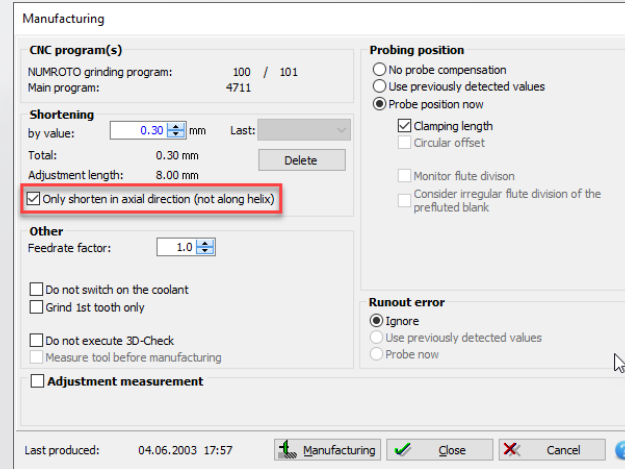
 Open  N

Manage filters...

## Manufacturing – only shorten in axial direction

(since version 4.2.0b)

- When manufacturing a tool a selection has been added which allows to use the shortening amount only in axial direction. The tool is then no longer rotated according to the shortening amount and the helix information.
- This shortening procedure is specially recommended for cross-cut tools (up-down end-mills, side milling cutters). Like this deviations can be avoided if bigger shortening amounts are used. When this function is active, only the clamping length can be probed.



The screenshot shows the 'Manufacturing' dialog box with the following details:

- CNC program(s):** NUMROTO grinding program: 100 / 101, Main program: 4711
- Shortening:** by value: 0.30 mm, Last: [dropdown], Total: 0.30 mm, Adjustment length: 8.00 mm, [Delete] button.
- Other:** Feedrate factor: 1.0, [Do not switch on the coolant], [Grind 1st tooth only], [Do not execute 3D-Check], [Measure tool before manufacturing], [Adjustment measurement].
- Probing position:** [No probe compensation], [Use previously detected values], [Probe position now], [Clamping length], [Circular offset], [Monitor flute division], [Consider irregular flute division of the prefluted blank].
- Runout error:** [Ignore], [Use previously detected values], [Probe now].
- Footer:** Last produced: 04.06.2003 17:57, [Manufacturing] button, [Close] button, [Cancel] button, [Help] button.



# Auto switch for wheel rotation speed

(4.3.0)

- Auto switch for automatic wheel rotation speeds for new operations

Default values - Manufacturing - Carbide

| Operation                       | Direction of rota... | Cutting speed[...] |
|---------------------------------|----------------------|--------------------|
| 1 Flute                         | Left                 | 18.00              |
| 2 Tip gashout                   | Left                 | 22.00              |
| 3 Ball gash out                 | Left                 | 22.00              |
| 4 Tip Notch                     | Left                 | 22.00              |
| 5 Cylinder relief               | Left                 | 22.00              |
| 6 Cylinder relief 2-6           | Left                 | 22.00              |
| 7 Tip relief                    | Right                | 22.00              |
| 8 Tip relief 2                  | Right                | 22.00              |
| 9 Ball relief                   | Left                 | 22.00              |
| 10 Ball relief 2-6              | Left                 | 22.00              |
| 11 Corner radius tip relief     | Left                 | 22.00              |
| 12 Corner radius tip relief 2-6 | Left                 | 22.00              |
| 13 Radial relief                | Right                | 22.00              |
| 14 Walk travel                  |                      |                    |
| 15 Opening                      |                      |                    |
| 16 Body clearance               | Left                 | 22.00              |

Maintain cutting speed of operation in case of a wheel change  
 Activate auto-checkbox for wheel rotation speed for new operations

Default

Cutting speed  
 Rotation speed

Tip/Tip gashout

Geometry

Center data

Widening

Wheel

Feedrates

Reduction

Cycles/Infeed

AC

Increments

General

Modifications

Change positions

**Selected wheel**

Name: --NUM--1V1--D100--B10--R0.1--W

Package: 2

Edit wheel data...

Select wheel...

**Rotation speed / direction**

Rotation speed: 4202 r.p.m

Cutting speed: 22.00 m/s

Direction of rotation:  Left  Right

# Inch / mm value converted in context menu

(4.3.0)

- The input value can be displayed in the context menu in the other measure system.

Cylinder/Relief 1

|                           |                                  |               |
|---------------------------|----------------------------------|---------------|
| <b>Geometry</b>           | Cylinder start                   | Cylinder end  |
| Wheel                     | 8.00000                          | 8.00000       |
| Feedrates                 | Land width: 0.048031             | 0.048031 inch |
| Cycles/Infeed             | Width of circular land: 0.000000 |               |
| Increments                | Cutting angle: 2.00000           |               |
| General                   | Displacement angle: 0.00000      |               |
| Modifications             | Grinding point offset: 0.000000  |               |
| Change positions          | Length modification: 0.177165    |               |
| Grinding position         | <b>Eng./diseng. slant</b>        |               |
| Cooling Valves            | <input type="checkbox"/> Slant   |               |
| Division/Helix            | Length: 0.059055                 |               |
| ISO disengagement program | Angle: 45.00000                  |               |
| ISO program               |                                  |               |

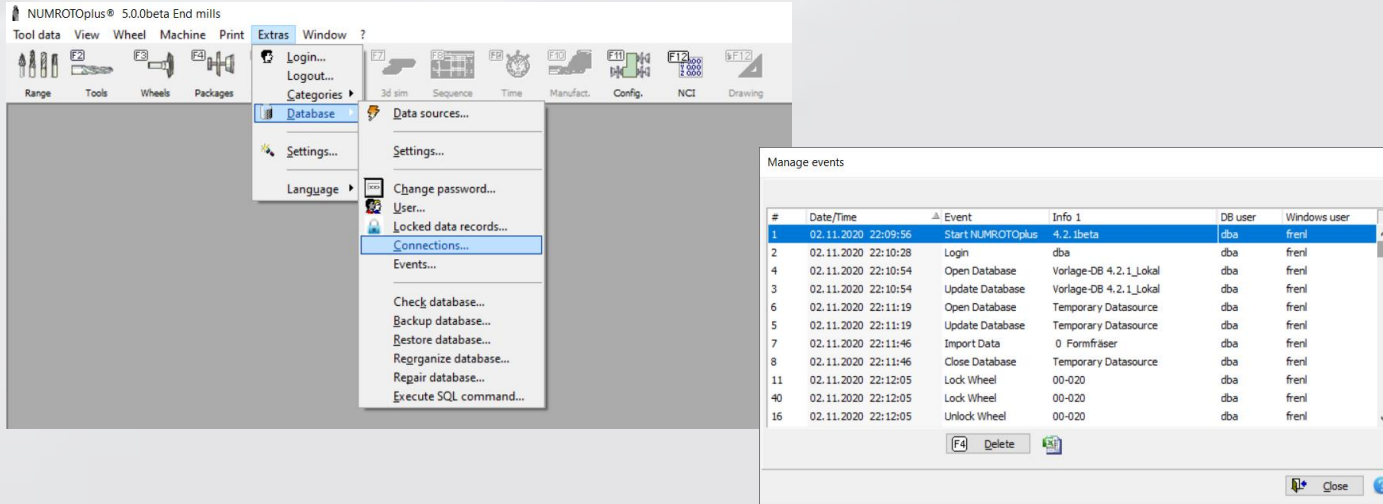
|                        |                |
|------------------------|----------------|
| Grinding point offset: |                |
| Original value         | 0.048031       |
| Default value          | 0.047244       |
| Min. value             | 0.000039       |
| Max. value             | 393.700748     |
| <b>Value in [mm]</b>   | <b>1.21999</b> |

Grinding position: Tangential

## Event logging

(4.2.1)

- The event log, which can currently be opened via the status bar, is now stored in the database. This means that all events are documented and available in a central location, even in a multi-user environment. The list of all events can also be exported as an Excel file.



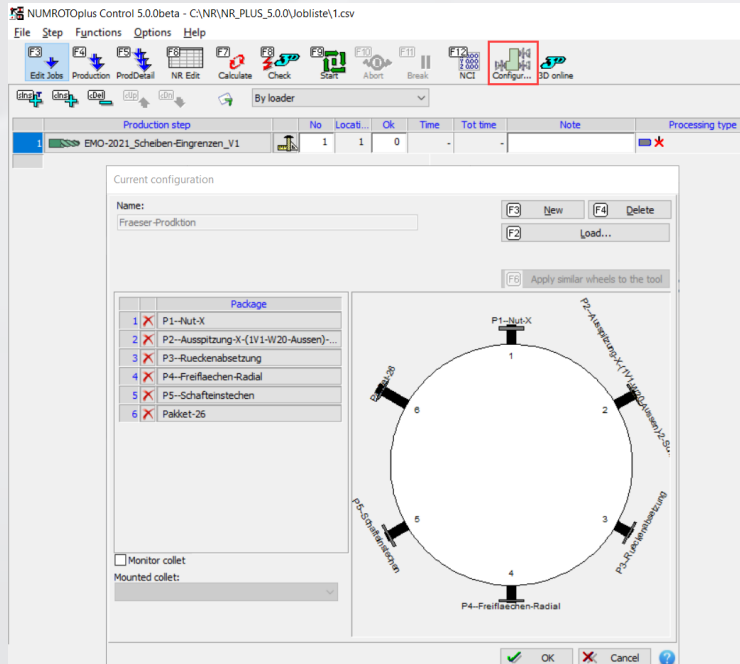
The screenshot shows the NUMROTOplus 5.0.0beta End mills software interface. The 'Database' menu is open, displaying options such as 'Data sources...', 'Settings...', 'Change password...', 'User...', 'Locked data records...', 'Connections...', and 'Events...'. The 'Connections...' option is highlighted. In the foreground, the 'Manage events' dialog box is open, displaying a table of event logs.

| #  | Date/Time           | Event             | Info 1                 | DB user | Windows user |
|----|---------------------|-------------------|------------------------|---------|--------------|
| 1  | 02.11.2020 22:09:56 | Start NUMROTOplus | 4.2.1beta              | dba     | frnl         |
| 2  | 02.11.2020 22:10:28 | Login             | dba                    | dba     | frnl         |
| 4  | 02.11.2020 22:10:54 | Open Database     | Vorlage-DB 4.2.1_Lokal | dba     | frnl         |
| 3  | 02.11.2020 22:10:54 | Update Database   | Vorlage-DB 4.2.1_Lokal | dba     | frnl         |
| 6  | 02.11.2020 22:11:19 | Open Database     | Temporary Datasource   | dba     | frnl         |
| 5  | 02.11.2020 22:11:19 | Update Database   | Temporary Datasource   | dba     | frnl         |
| 7  | 02.11.2020 22:11:46 | Import Data       | 0 Formfräser           | dba     | frnl         |
| 8  | 02.11.2020 22:11:46 | Close Database    | Temporary Datasource   | dba     | frnl         |
| 11 | 02.11.2020 22:12:05 | Lock Wheel        | 00-020                 | dba     | frnl         |
| 40 | 02.11.2020 22:12:05 | Lock Wheel        | 00-020                 | dba     | frnl         |
| 16 | 02.11.2020 22:12:05 | Unlock Wheel      | 00-020                 | dba     | frnl         |

## NR-Control: Configuration

(4.2.1)

- Now the configuration can be opened directly from NR-Control

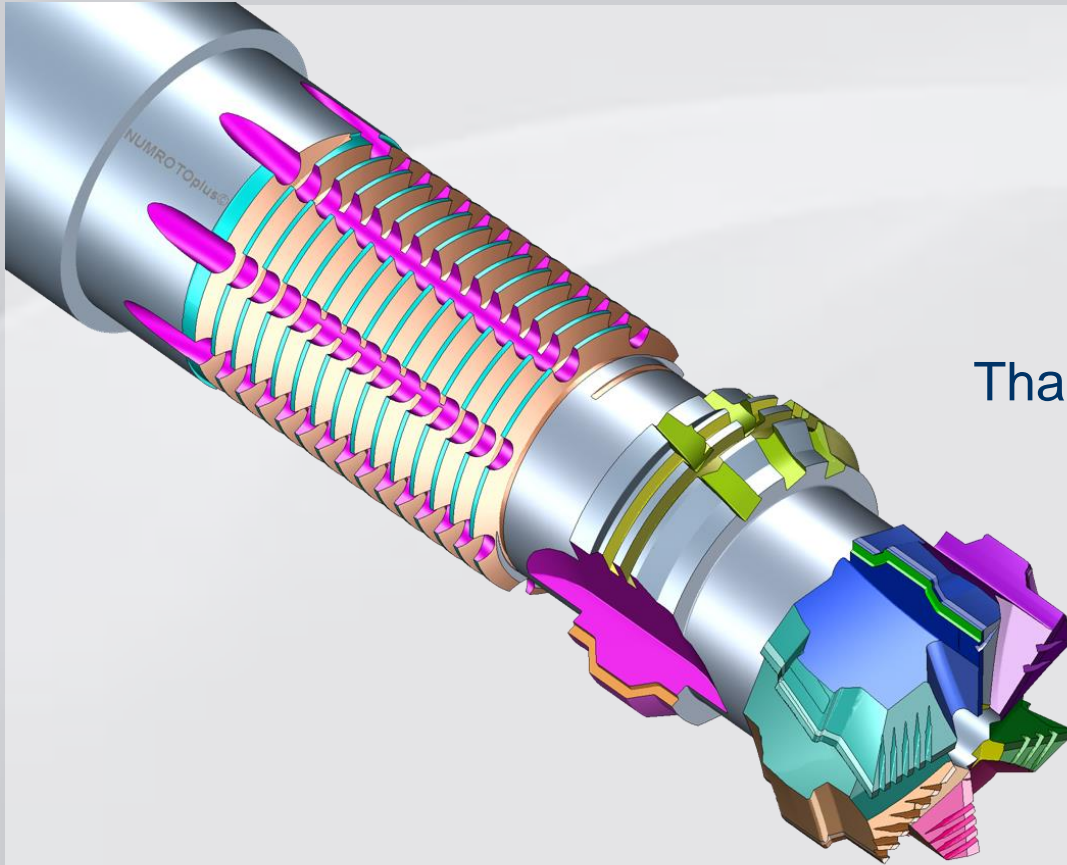


## Other innovations in 4.2.1 and 4.3.0

- Side distance is calculated more accurately on ball nose when using gash out-X (4.3.0)
- End mill: 5 tooth groups with 6 teeth (4.2.1)
- The calculation time for creating the CNC file was optimized (4.3.0)
- Step face cam: 2nd machining length without infeed added (4.2.1)
- NR-Control: The display of the collision check process is no longer shown in a separate window (4.2.1).
- DXF form step (drill): Concave radii accurate even for small diameters (4.2.1)
- Shaper cutter - longitudinal offset during clamping length probing - or reduction shortening amount (4.2.1)
- K-land probing with coolant hole needle possible in direction of rake angle surface (4.3.0)
- Tooth center position probing now also possible with form cutter (4.3.0)
- Time optimization, avoidance of idle times in NR Control (4.2.1)
- 2D collet collision monitoring more accurate (4.2.1)

Further information:

Release Notes in the NUMROTO customer area:  
[www.numroto.com](http://www.numroto.com)



Thank you for your interest!