



NUM *roto*®

Total solution for tool grinding

Technical description

CNC GRINDING WITH 325LINEAR SERIES

Technical description

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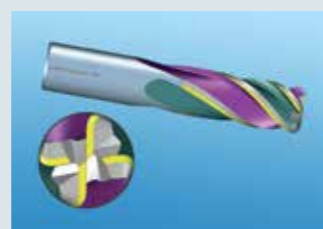
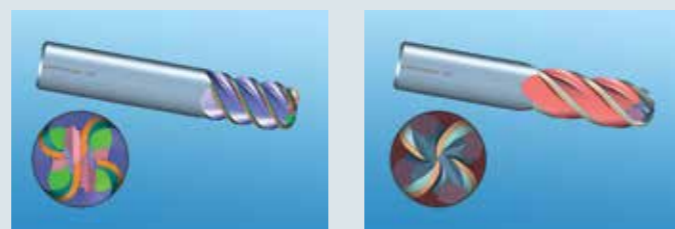
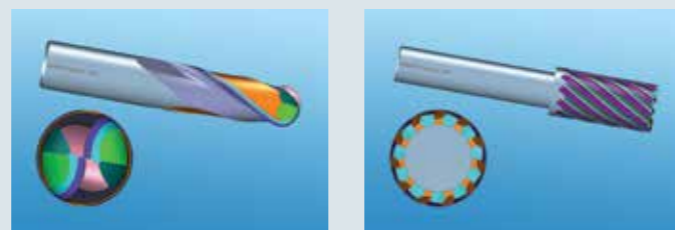
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MILLING CUTTERS

N100: Simple milling cutters

- Body form: parallel and tapered
- Face form: flat, full radius, corner radius, chamfer
- Helix: right-hand helix/right-hand cutting, left-hand helix/left-hand cutting
- Body clearance

This option is designed for re-sharpening of simple cutters.



N110: Extension for complex milling cutters

This option demands item N° N100.

- Right-hand helix / left-hand cutting
- Left-hand helix / right-hand cutting
- Differential helix
- Supplementary flutes
- Manual flutes
- Manual tip reliefs
- Separate division
- Separate helix programming
- Cylinder relief up to 10 variants
- Manual grinding path
- Radial reliefs
- Gash out rounding
- S-cutting edge in ball center
- Radius modification

N120: Multi helix

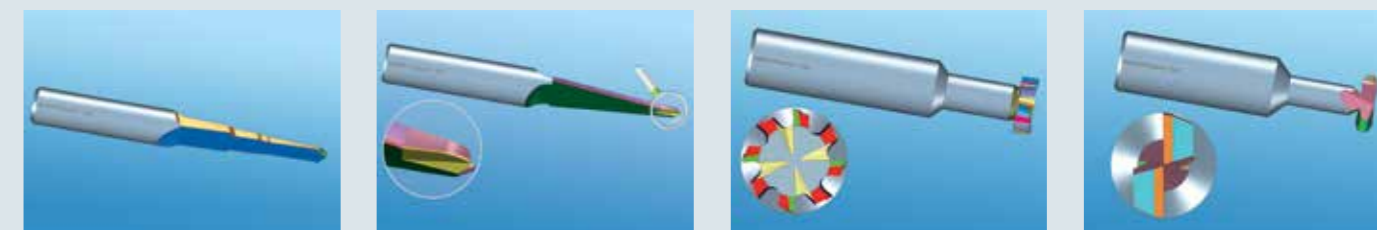
This option demands item N° N110.

Only for cylindrical milling cutters with up to 12 different helix angles.

N150: Form cutters

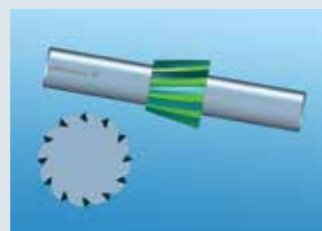
Body form: form defined by a DXF file

Face form: flat

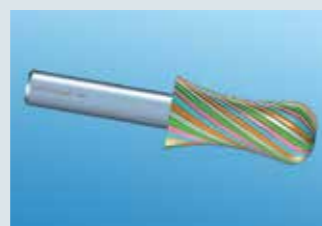
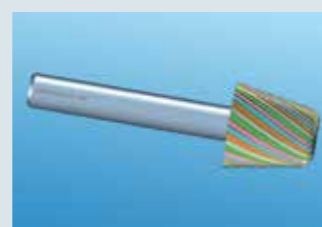
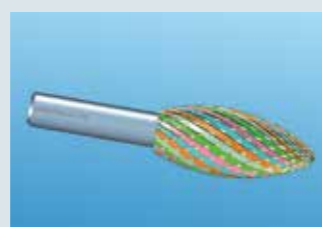
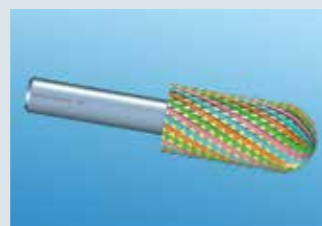


N160: Saw cutters

This option demands item N° N110.

**N170: Burrs**

- Cylinder or taper, optional with ball nose
- Convex body (one radius)
- Convex body with ball nose (two radii)
- Sphere
- DXF-Contour (Limited feasibility depending on the wheel)
- Grouped teeth for burrs (up to 20 different groups)

**N180: Extension for wave grinding in production mode**

This option demands item N° N110.

Remark: In the field of wave grinding there is a patent pending. It is the responsibility of the machine manufacturer respectively the end user to clarify the patent situation regarding the planned use of this option.

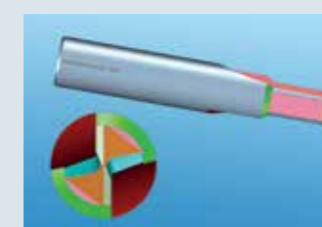
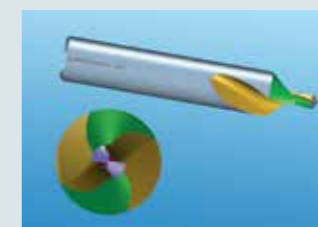
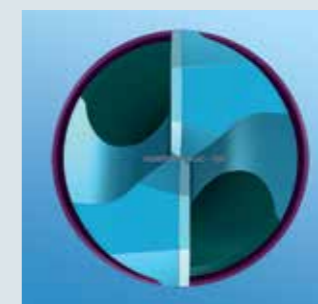
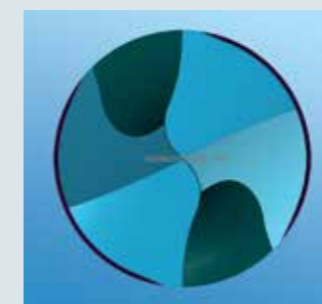
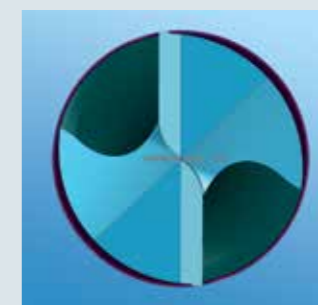
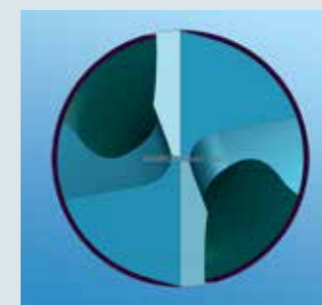
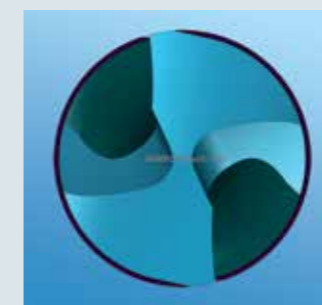
**N190: Extension for wave grinding in sharpening mode**

This option demands item N° N110.

Includes the probing of the cutting edge and sharpening of the reliefs along the wave cut.

**DRILLS****N200: Simple drills**

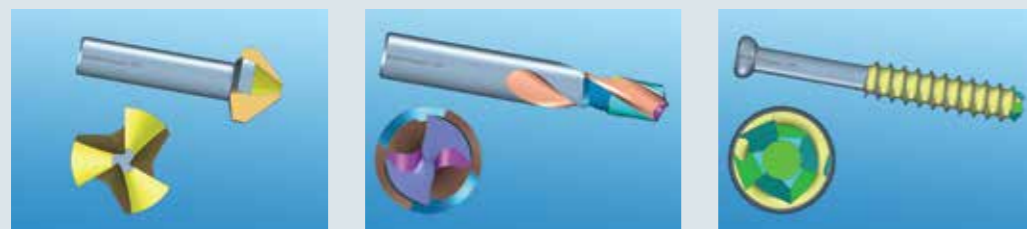
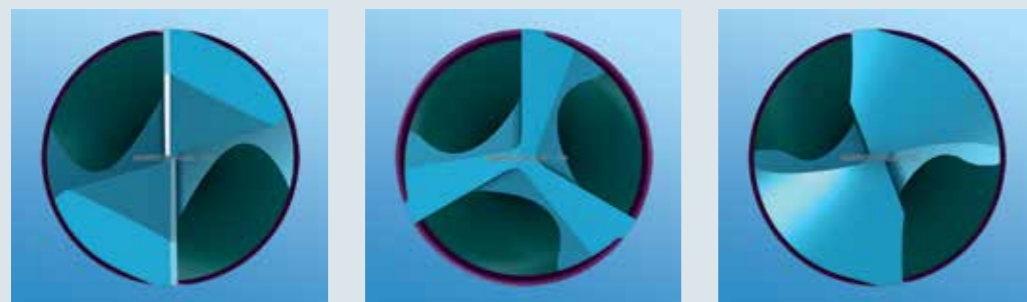
- Points: spiral point, 4-facet, S4, S6, T3
- Flute and clearance operation
- Up to 3 diameters
- Straight step transitions with programmable angle



N210: Extension for complex drills

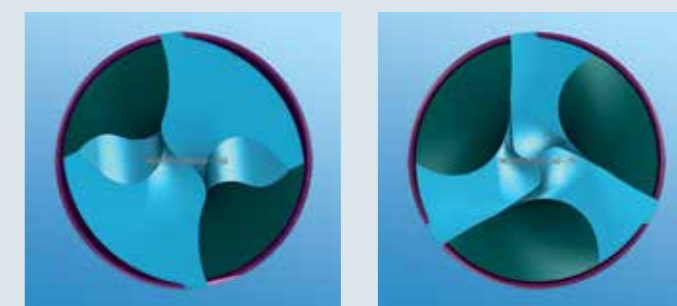
This option demands item N200.

- Points: break point, end mill tip, KM3, KM-V
- Up to 10 diameters
- Length with taper on each step programmable
- K-land along the flute
- Swivel flute
- Step face clearance
- Cutting edge correction
- Flute form adaptation
- Programmed core
- Separate division
- Separate helix programming
- Cylinder relief up to 10 variants
- Manual grinding path
- Chip breaker on drill point
- Scalping cut (tap)
- Countersink



N214: Extension for Kennametal-points: SE/TF

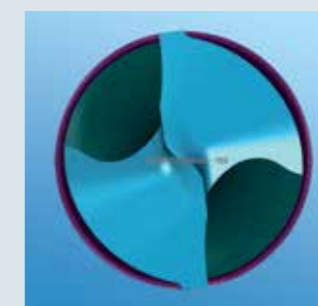
This option demands item N° N200.



N215: Extension for Kennametal-point: HP

This option demands item N° N200.

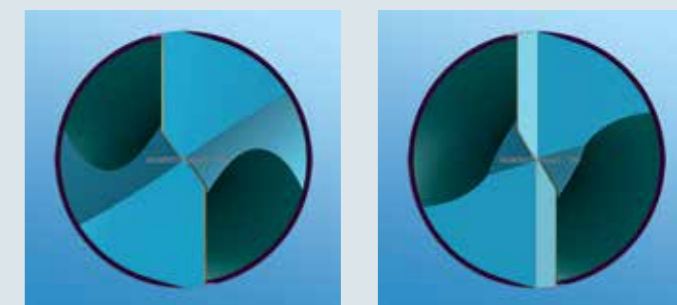
Approval by Kennametal necessary.



N216: Extension for Klenk-points. (WEGANIT, WEGATIN, WEGABLU, POLLUX)

This option demands item N° N200.

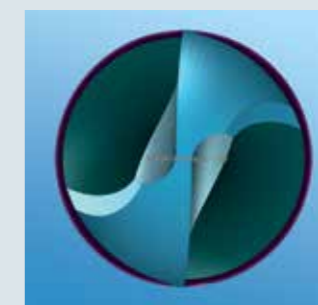
Approval by Klenk company necessary.



N217: Extension for Gühring-point: RT 100 R

This option demands item N° N200.

Approval by Gühring necessary.

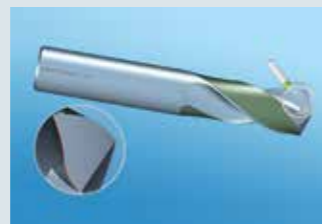


N220: Extension for differential helix

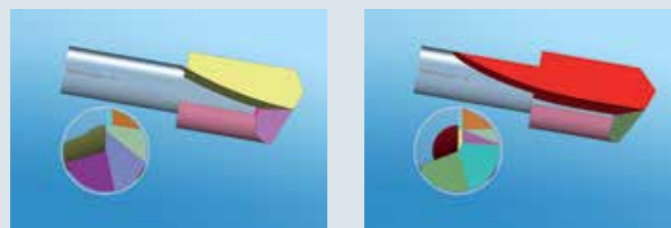
This option demands item N° N210.
Variable helix angle over a given length of the cutting section. For step drills, limited use only.

**N240: Extension for K-Land on drill points**

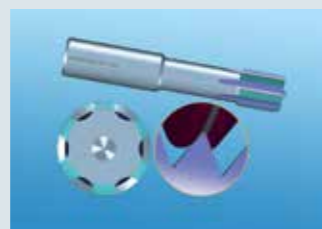
This option demands item N° N200.
Feasibility depending on drill point type.

**N250: Extension for gun drill points**

This option demands item N° N200.

**N260: Extension for forming taps**

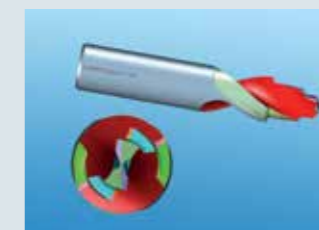
This option demands item N° N150.
Modulation of diameter according to NUMROTO calculations.
(customer specific adaptation possible)

**EXTENSIONS FOR MILLING CUTTERS AND DRILLING TOOLS****N300: Extension for cylindrical grinding**

This option demands item N° N100, N200 or N150.
A work spindle which supports continuous rotation for cylindrical grinding is necessary for this version.

**N340: Extension for form steps**

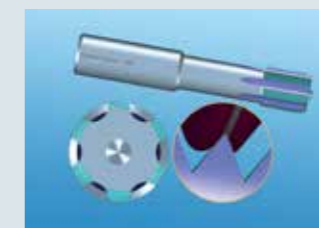
This option demands item N° N200.
Defined by DXF files.

**N550: Special Grinding Functions**

For this option at least one of the following articles is needed: N150, N110 or N210.

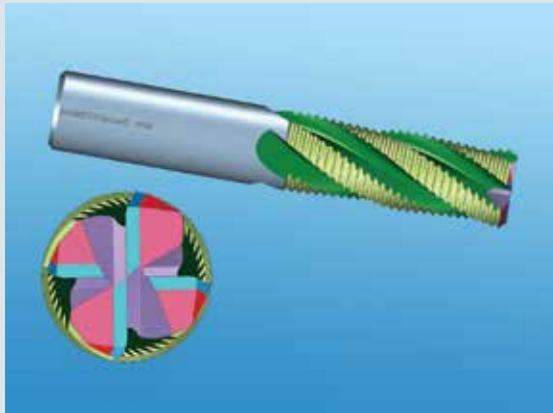
This add-on option includes the following functions:

- Overlapping of a sin wave movement in order to modify the diameter (polygon modification) for the following operations: Flutes (only in form cutter module), manual step face cam, manual grinding path, plunge grinding (only in form cutter module)
Possible applications: flow drills, add-on operations for forming taps.
- Grinding operation: manual profile grinding path:
Grinding of a profile which can be defined on a plane
Grinding procedure: peripheral grinding in form direction
Possible application: Grinding of seats for inserts
- Automatic orientation of the grinding point at 12 o'clock for the manual flute when using shape wheels.
Can only be used in drill module.
- Correction profile for form cutters and form steps
- Multi angle point
- Independent flute
- Independent manual flute
- Variable helix for burrs
- Variable gash-out angle for drill S-gash-out
- Flute-X
- Gash-Out X



N265: Extension for rough profile

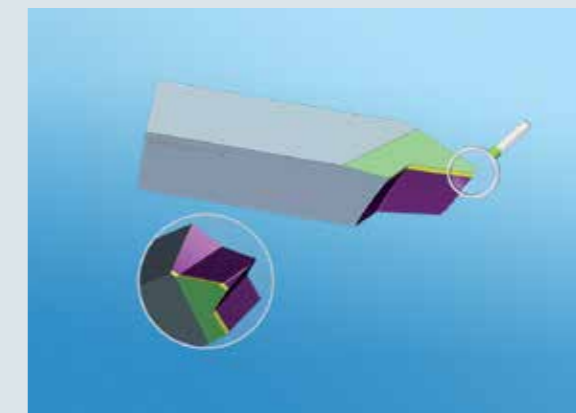
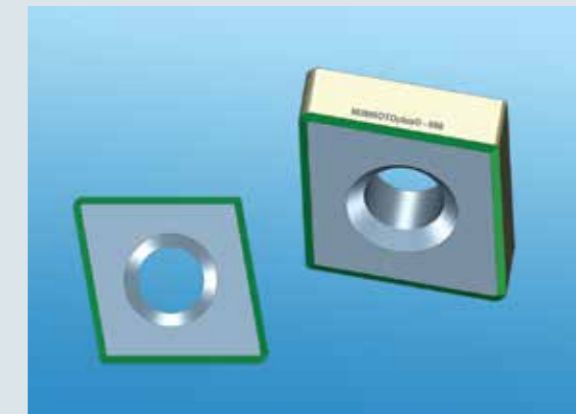
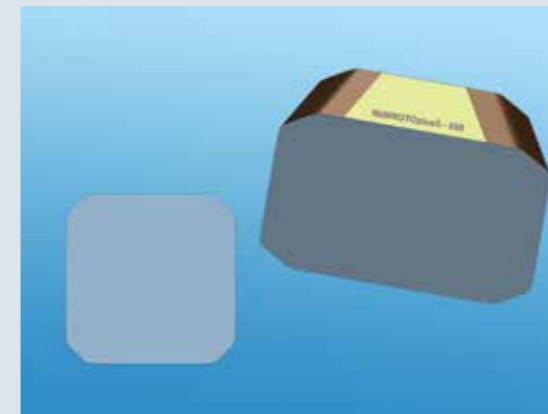
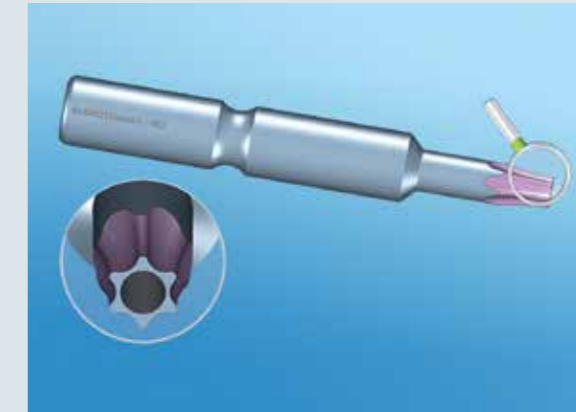
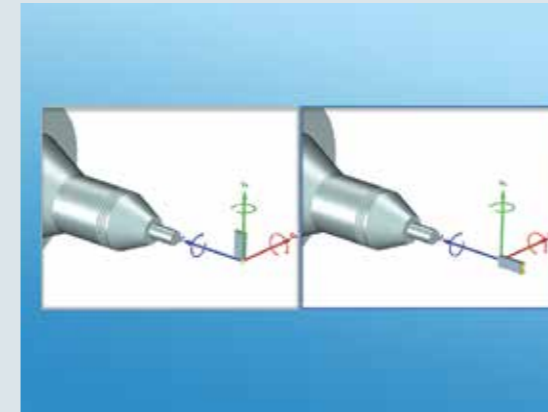
This option demands item N° N100.

**CLAMPING SYSTEM TRANSFORMATION****N400: Extension for clamping system transformation**

This option demands item N° N150.

Feasibility limited depending on machine layout and clamping system.

Probing of tool location not possible.



GEAR CUTTING TOOLS

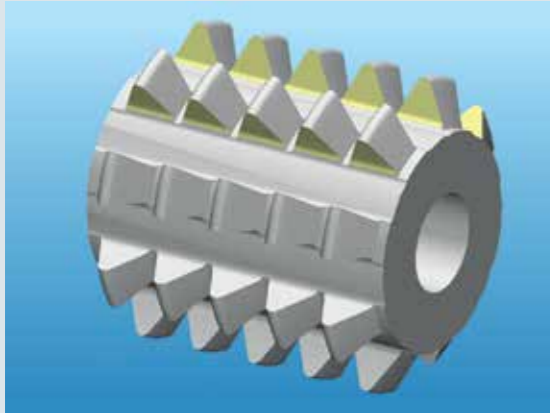
N500: Hob sharpening

Resharpener of hobs in the flute.

The following operations are available:

- Flute
- Manual flute
- K-Land along the flute (additional flute operation)

In order to get a straight rake face on helical hobs a specially calculated and dressed grinding wheel might be needed. The calculation of such a grinding wheel and the dressing is not included in this module.



N530: Extension for shaper cutters. Grinding of tip.

This package permits the regrinding of the rake surface of shaper cutters either in the form of conical grinding or a step cut.



SUPPLEMENTARY FUNCTIONS

N700: Automatic tool measurement using a probe.

For milling cutters, drills/step drills and form cutters.

N710: Automatic wheel measurement using a probe

For peripheral and cup wheels, diameter and flange dimension.

N720: In-process measurement

This option demands item N° N700.

Measurement of ground diameter immediately after the according operation is finished. Available for several operations. Detailed information upon request.

After measurement automatic compensation and repetition of the operation if needed.

N730: Wheel profile determination

Wheel profile determination based on a given flute profile. (DXF-format or text file with polygon points)

N740: Wheel dressing

Using a dressing disk, according to NUMROTO specifications.

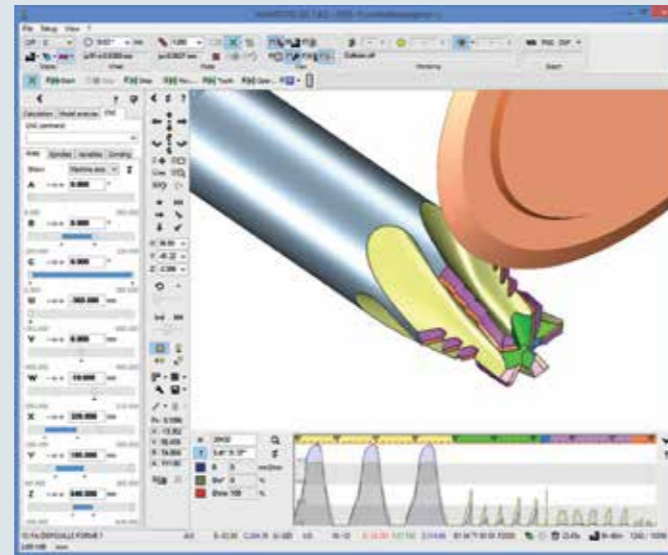
N750: Sticking grinding wheels

Using a sticking unit according to NUMROTO specifications.

SIMULATION SOFTWARE

N900: Tool simulation with animation of the grinding process (material removal)

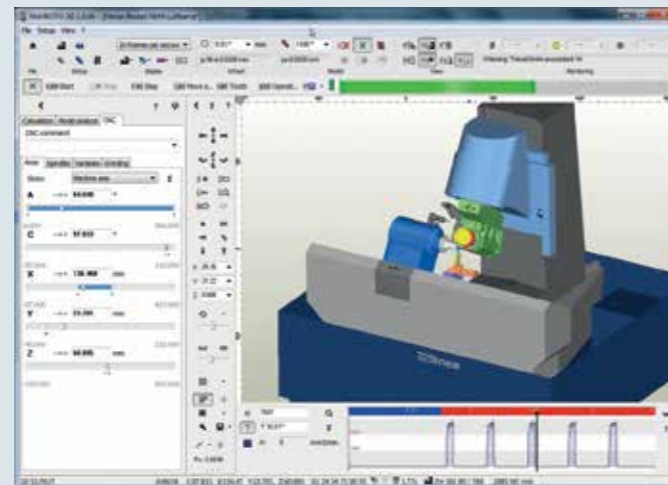
Calculation of a 3D model from the programmed tool.
Material removal simulated step by step.



N910: Collision checking with 3D machine simulation

Collision checking between all defined machine parts and the grinding wheels. Collision checking between grinding wheels which are not used and the blank.

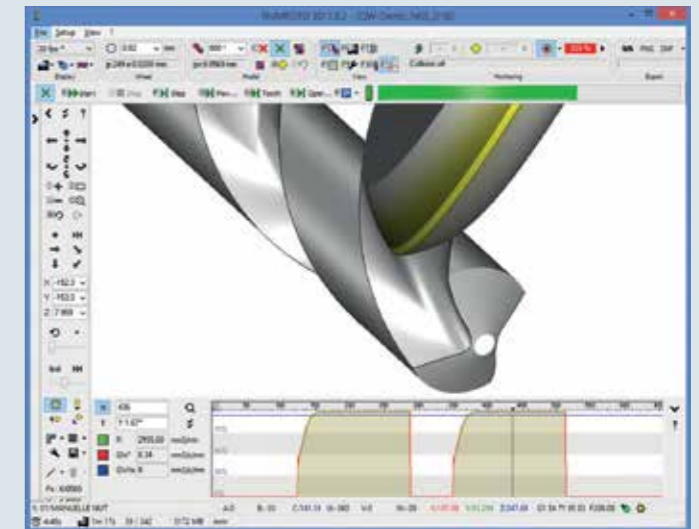
Animation of machine movements based on the calculated CNC file (without generation of a 3D tool model, no material removal).



N920: 3D Special functions

Several additional functions for the 3D tool simulation:

- Determination of the value QW' (specific material removal rate)
- Display of the center of gravity
- Export of 3D model as 2D and 3D DXF lines
- Automatic monitoring of removal rate during 3D collision check
- Real time simulation
- STL comparison
- Stereo-3D display



N930: 3D-online simulation

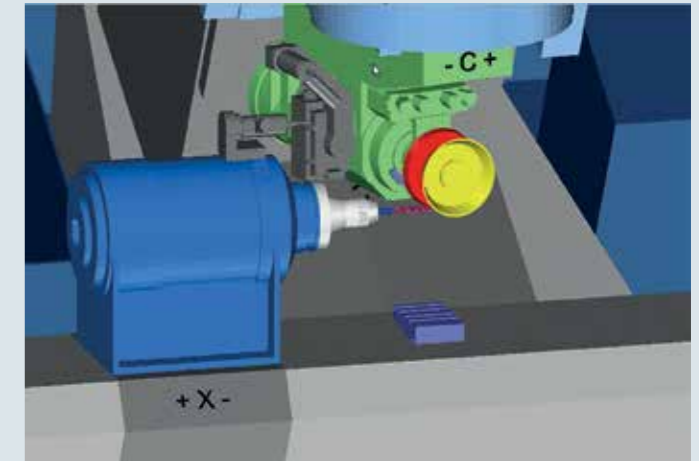
This option demands item N° N910.

Adds the possibility to show the current position of the machine in the 3D simulation as long as there is an active connection between the computer and the control.

Minimal software revision on CNC: L1

Lag time (real time performance) between machine movements and display on the computer depends on the interface which is used to connect the PC to the CNC.

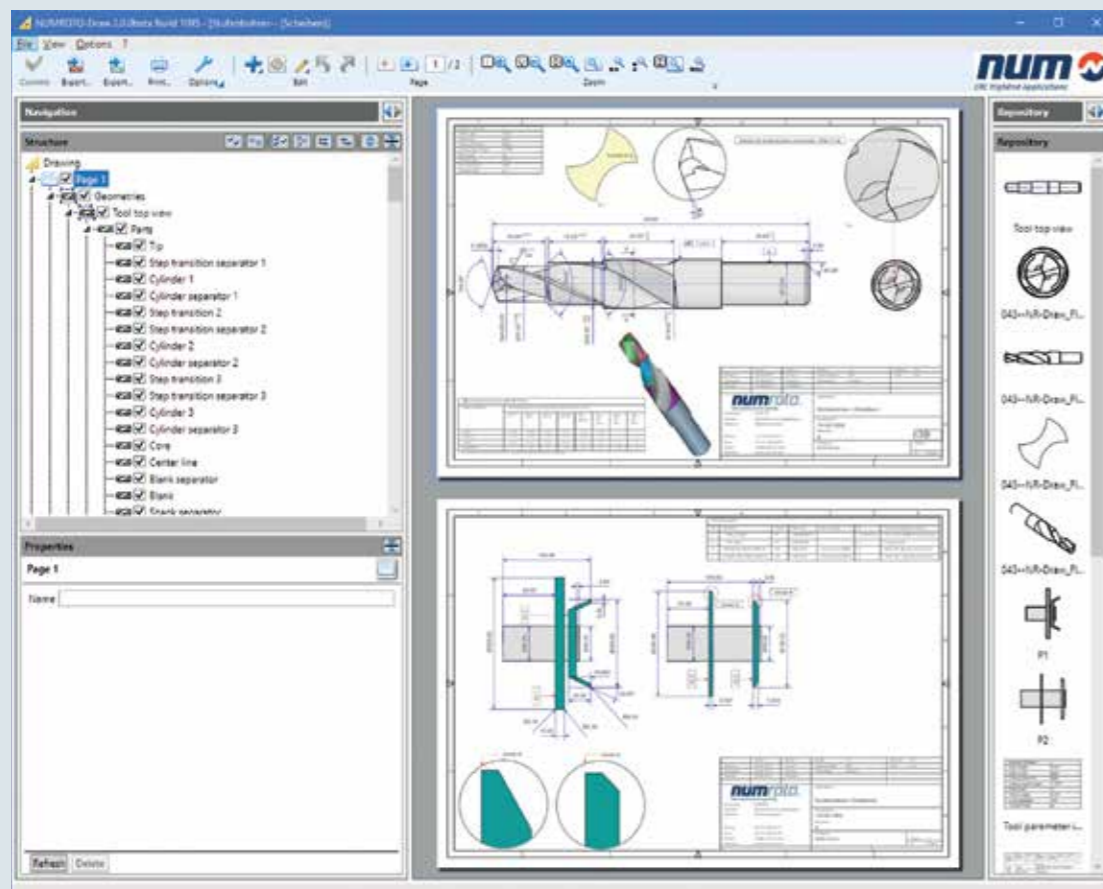
The TCP/IP interface is highly recommended.



DOKUMENTATION

N940: NUMROTO-Draw

Program to generate automatically a drawing (front view) for end mills, drills, step drills and form cutters.



ASSIGNMENT TO ORDER NUMBERS OF COMPANY NUM

Schütte No.	NUM No.	Description
N100	CH-50052350	Simple milling cutters
N110	CH-50052360	Extension for complex milling cutters
N120	CH-50052430	Extension for multi helix
N150	CH-50052150	For form cutters
N160	CH-50052580	Extension for saw cutters
N170	CH-50052300	Burrs
N180	CH-50052290	Extension for wave grinding in production mode
N190	CH-50052570	Extension for wave grinding in resharpening mode
N200	CH-50052370	Simple drills/step drills
N210	CH-50052380	Extension for complex drills/step drills
N214	CH-50052090	Extension for Kennametal-points: SE/TF
N215	CH-50052490	Extension for Kennametal-point: HP
N216	CH-50052470	Extension for Klenk-points
N217	CH-50052700	Extension for Gühring-point: RT 100 R
N220	CH-50052240	Extension for differential helix
N240	CH-50052460	Extension for K-Land on drill points
N250	CH-50052320	Extension for gun drill points
N260	CH-50052680	Extension for forming taps
N265	CH-50052145	Extension for rough profile
N300	CH-50052100	Extension for cylindrical grinding
N340	CH-50052080	Extension for form steps
N400	CH-50052450	Extension for clamping system transformation
N410	CH-50052780	3-axis oscillation for form relief grinding
N500	CH-50052590	Hob resharpening
N510	CH-50052880	Interface for external calculation
N530	CH-50052330	Extension for shaper cutters
N550	CH-50052480	Special Grinding Functions
N700	CH-50052110	Automatic tool measurement using a probe
N710	CH-50052190	Automatic wheel measurement using a probe
N720	CH-50052690	Extension for in-process measurement
N730	CH-50052310	Wheel profile determination
N740	CH-50052250	Extension for wheel dressing
N750	CH-50052870	Extension for sticking grinding wheels
N760	CH-50052550	Data interface
N800	CH-50052201	Machine license fee incl. 1 hardlock
N810	CH-50052015	License fee, multi-user extension
N900	CH-50052670	3D - Tool simulation with animation of the grinding process (material removal)
N910	CH-50052660	3D - Collision checking with 3D machine simulation
N920	CH-50052720	3D - Special functions
N930	CH-50052710	3D-online simulation
N940	CH-50052740	NUMROTO-Draw
N950	CH-50052230	NUMROTO-Control (loader fuctions)
N960	CH-50054551	Additional hardlock for a further programming station without CNC code output.
N961	CH-50054558	10 additional hardlock for a further programming station without CNC code output.
N962	CH-50054552	Replacement hardlock
N963	CH-50054561	Hardlock with time limit
N964	CH-50054562	Extension of hardlock with time limit (repeated programming)
N965	CH-50054560	Replacement of an existing software package on CD
N970	CH-50052120	Windows operator screen for display and control
N990	CH-50054559	Express delivery surcharge



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