



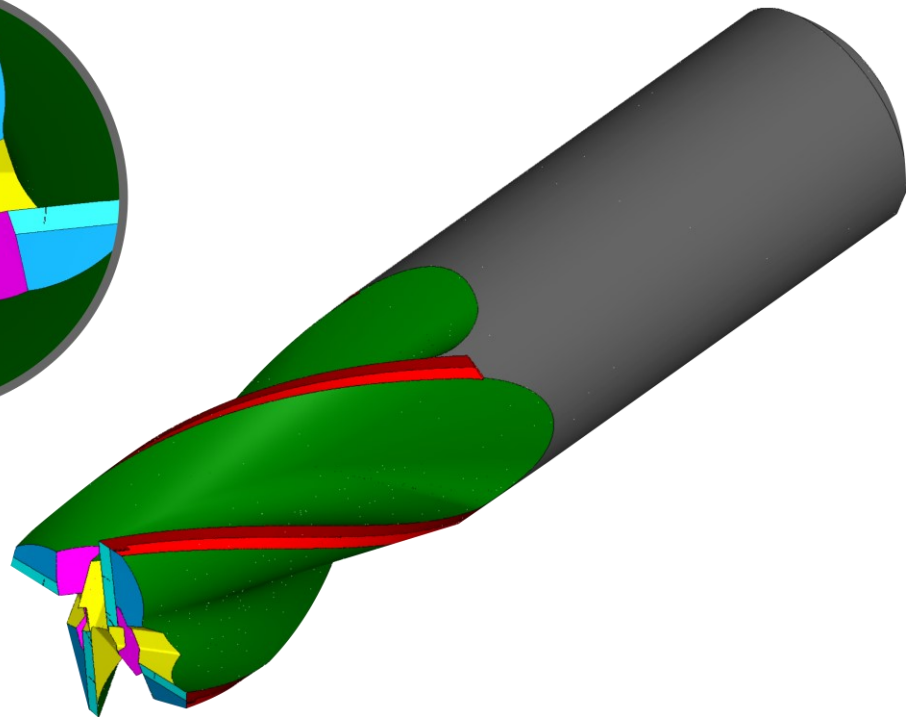
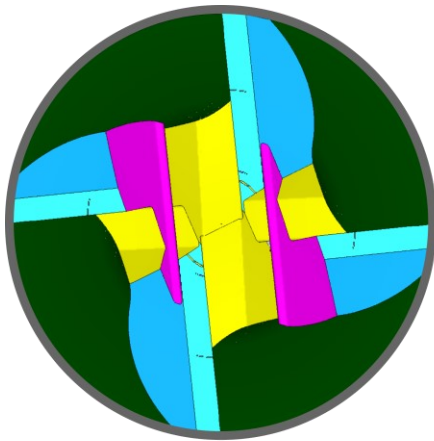
MTS AG
Mathematisch-Technische-Software

tool-kit PROFESSIONAL by MTS AG

Software-Modules

Spezifikation

Stand: 07.06.23



MTS AG
Rheinstraße 81
CH-4133 Pratteln 1
Tel.: 0041 / 61 81 59 130
Fax.: 0041 / 61 81 59 139
e-mail: info@mtsag.net
www.mtsag.net

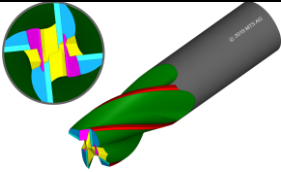
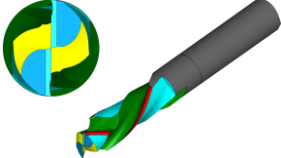
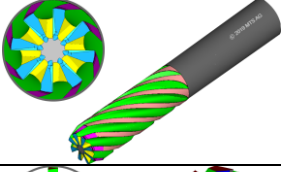
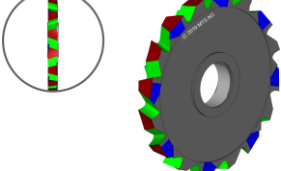
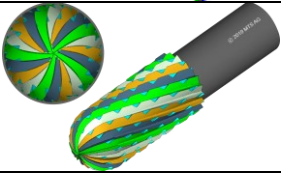
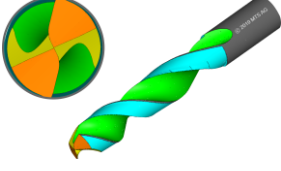
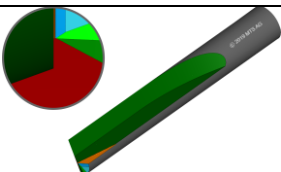
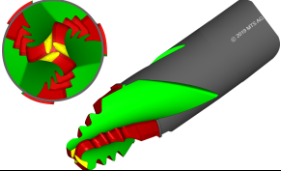
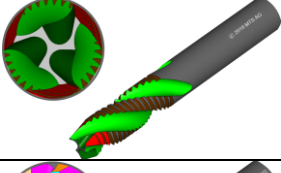
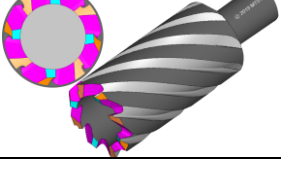


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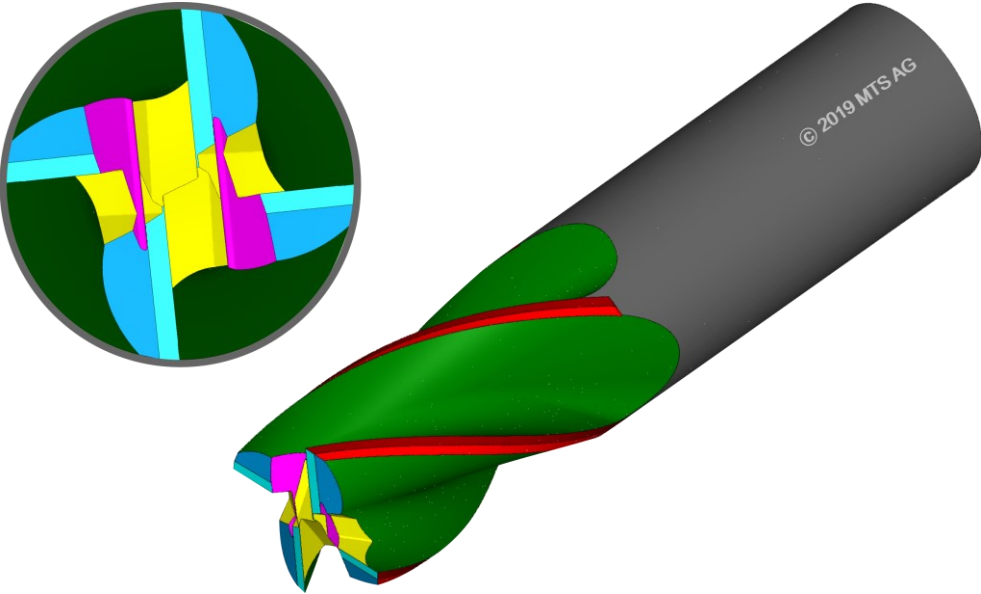
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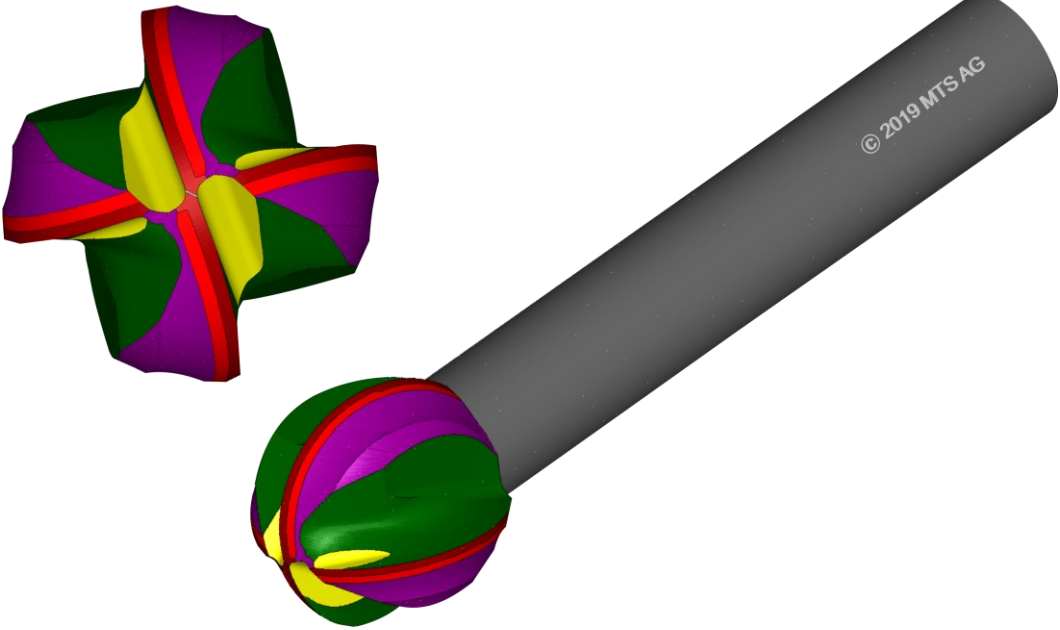


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1.1 End Mills	FMENU
	
1.1 Basic Modul End Mills	
<ul style="list-style-type: none"> • Workpiece: Cylinder Taper Angular Cutter • Point: Plan Face Chamfer Corner Radius Ball Nose Circular Arc Double Radius • Geometry: Regulare 2 at Center 1 above Center Centring Point 3 at Center 4 at Center • Cutting Edge Combination: right helix/right cutting left helix/left cutting right helix/left cutting left helix/right cutting • Division: Equal / unequal division of teeth • Periphery Linear relief: 1st/ 2nd /3rd relief angle Radial relief: Cross-/ longitudinal Roughing Grind direction: Forward / backward Optional spark out grinding. 	<ul style="list-style-type: none"> • Production / Regrinding: Production by different infeed (several steps) Regrinding with calculation of removal length, periphery and rake. Regrinding, finishing with different wheels • Main Fluting Meas. definition: Point-/ normal cut Grind direction: Forward / backward Optional spark out grinding • Taper: Constant angle / constant helix Regrinding with undefined helix • Notching Radius at entry and exit Variable entry- and aperture angle • Profile Simulation Simulation of intersection at all operations Wheel/workpiece-simulation Machining simulation • Shank Reducing the shank diameter Clamping area

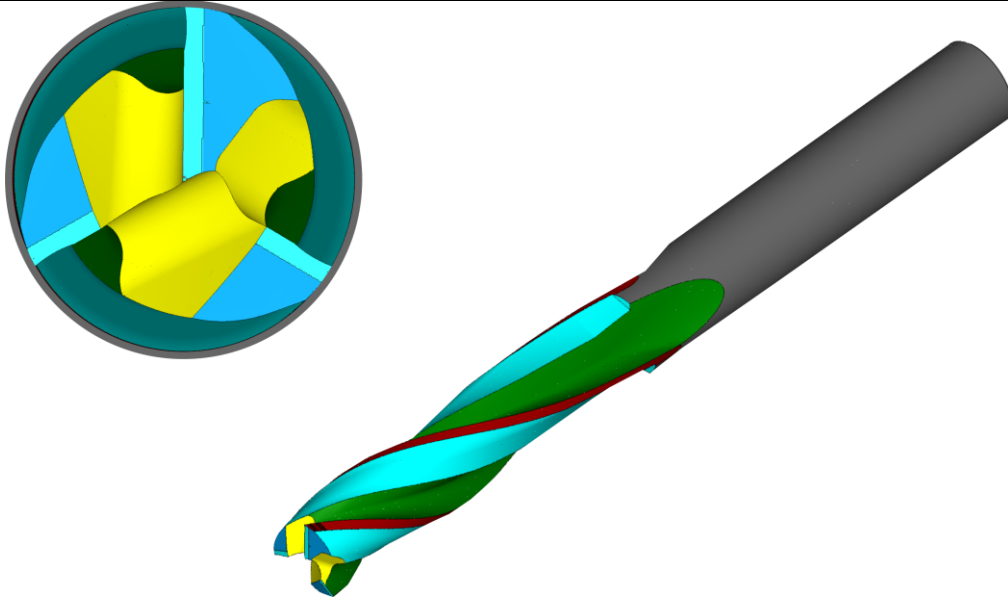


1.2 End Mill Ball	FMENU
	
1.2 Ball Extension to 1.1:	
<ul style="list-style-type: none">• Ball	



1.3 End Mill Variably Helix

FMENU



1.3 Variably Helix Extension to 1.1:

- **Variably Helix of Fluting:**
- Cylindrical and tapered tools

- Front and rear angle of helix
- 3 sections: Constant angle within 1. and 3. section; transition between front and rear helix-angle within 3. section
- Rising or falling helix

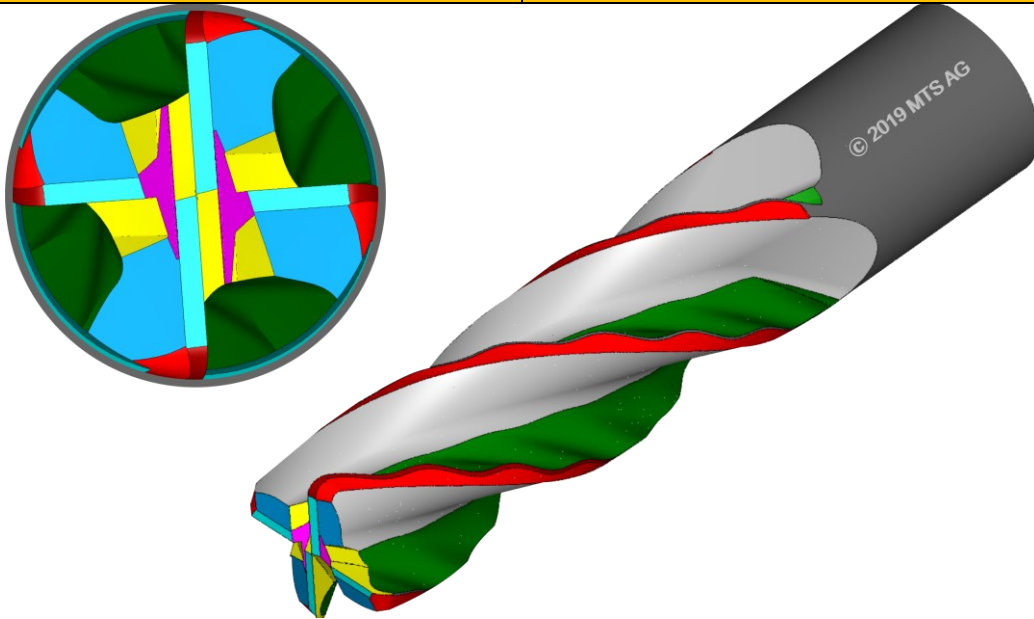


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1.4 End Mill Wave Cut

4FMENU



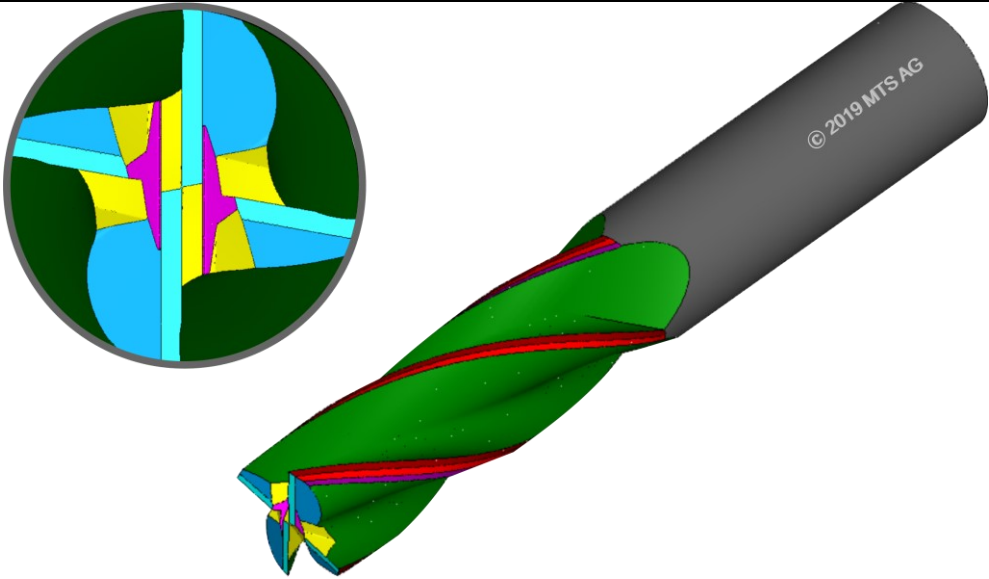
1.4 Wave Cut(Crest-cut)

Extension to 1.1:

(Production only; regrinding on demand)

- Cylindrical tools**
 Roughing cutting corresponding to a sinusoidal cutting edge along the helix
 Period and amplitude of wave according to sinus-function
 Starting point offset at every tooth
 Orientation of wave to the tool-center or to the cutting edge



2.1 Multi Cutter End Mills	MMENU
	
2.1 Multi Cutter End Mill Basic	
<ul style="list-style-type: none"> • Specification: Cylindrical standard end mills 2 teeth at center: max. 8 teeth • Geometry: Tools with 2 at center geometry Tools with groups of different fluting and periphery cutting edges: 2 teeth: 2 groups 3 teeth: 3 groups 4 teeth: 2 or 4 groups 5 teeth: 5 groups 6 teeth: 2 or 3 groups 8 teeth: 2 or 4 groups • Division: Different tooth division 	
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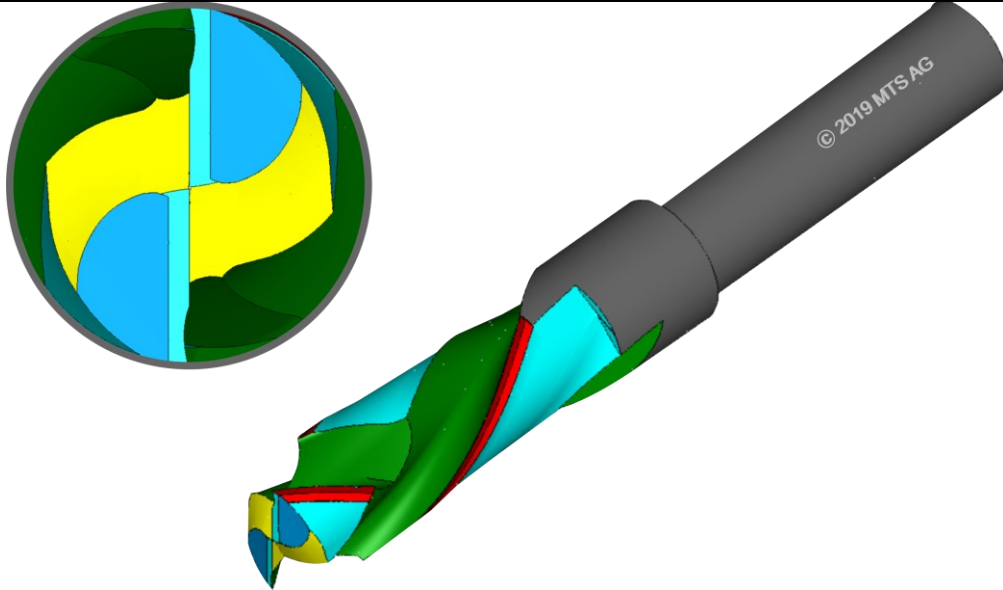


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2.2 Cross Cutting (Up-Down-Fend Mill)

2MMENU



2.2 Cross Cutting (Up-Down-End Mill)

Extension to 2.1:

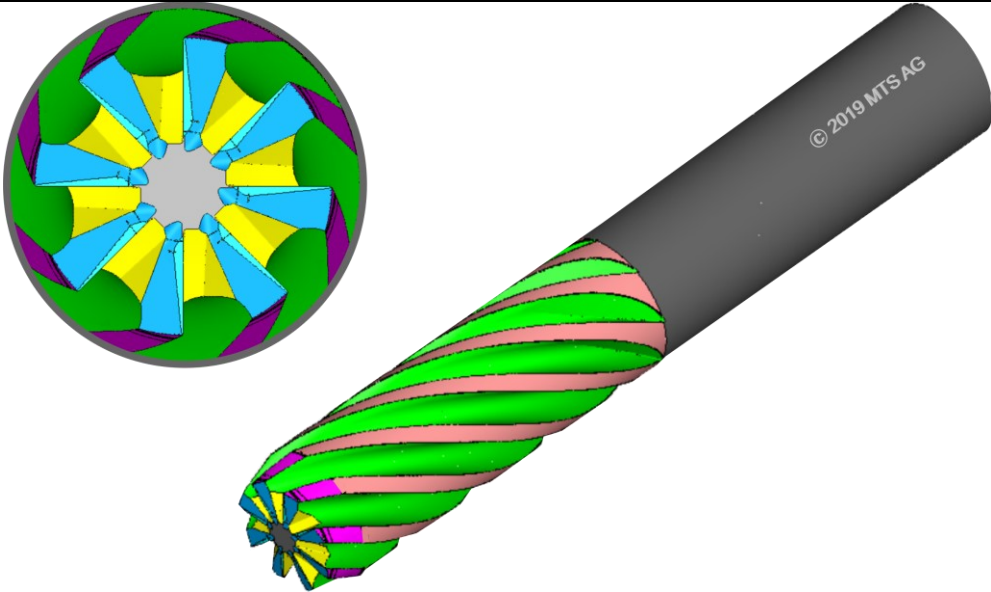
Cross Cutting:

- 2, 3 or 4 teeth tools with two crosswise
- cutting edges for each tooth:
- Primary fluting: right helix
- Cross cutting: left helix
- Axial and radial tooth offset
- Cutting lengths and approach strategies are freely selectable.

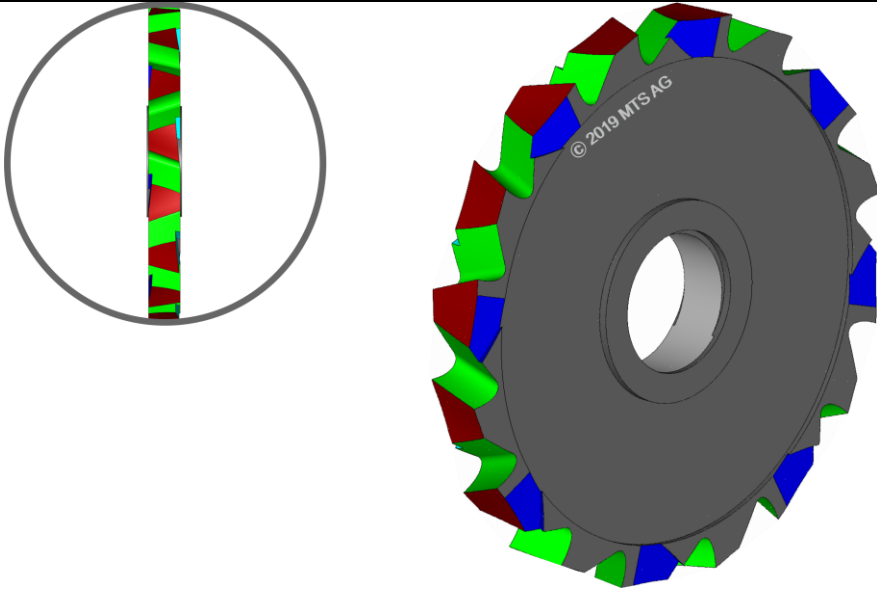


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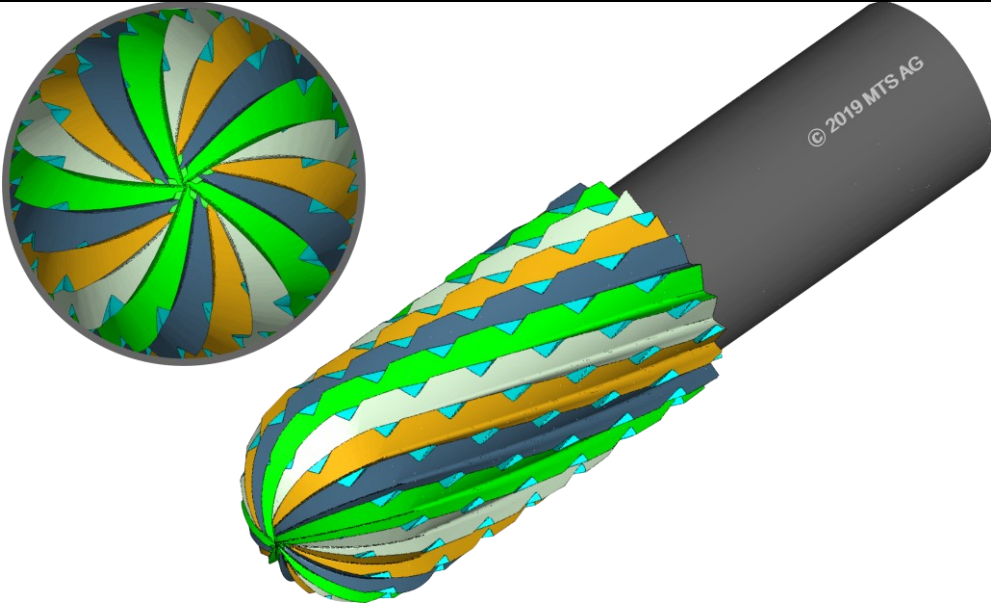
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3.1 Reamer	RMENU
	
3.1 Basic Modul Reamer	
<ul style="list-style-type: none"> • Work Piece: <ol style="list-style-type: none"> 1. Cylinder 2. Taper • Face: <ul style="list-style-type: none"> Plane without cutting edge Milling end face • Cutting Edge Combination: <ul style="list-style-type: none"> right helix/right cut left helix/left cut right helix/left cut left helix/right cut • Devision: <ul style="list-style-type: none"> equal unequal (free division between all teeth) • Preparation: <ul style="list-style-type: none"> Separation Profile roughing Profile finishing • Production / Regrinding <ul style="list-style-type: none"> Production in several infeeds • Main Fluting: <ul style="list-style-type: none"> Workpiece with pairs of different fluting geometries 	<ul style="list-style-type: none"> • Periphery <ul style="list-style-type: none"> Like end mills Pos. 1. • Heel: <ul style="list-style-type: none"> Like end mills Pos. 1. • Chamfer <ul style="list-style-type: none"> Linear relief: 1./2./3. relief angle Radial relief: transverse/longitudinal • 2nd Chamfer <ul style="list-style-type: none"> Optional: 2nd chamfer • Chamfer: <ul style="list-style-type: none"> Face groove grinding.
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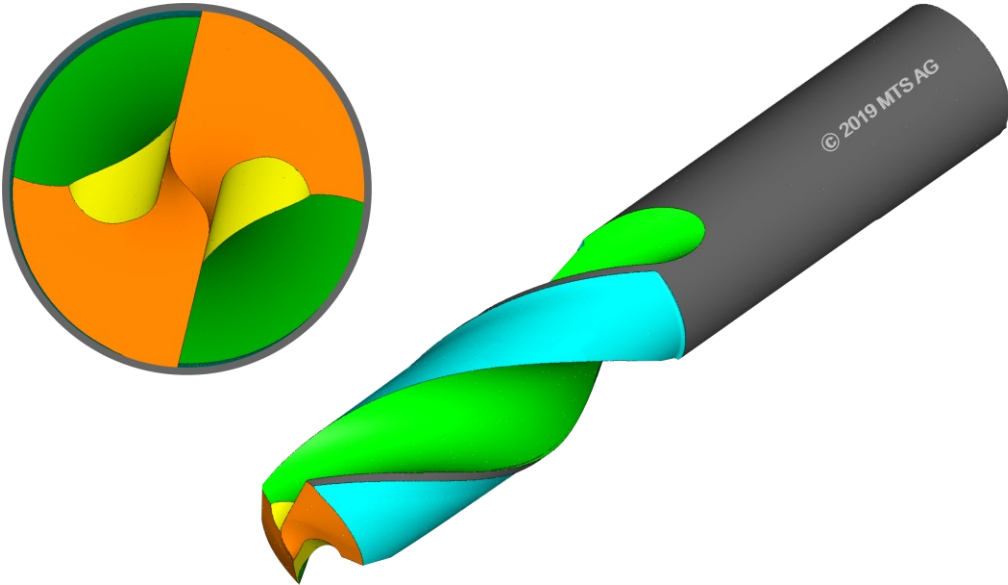


4.1 Side Milling Cutter	NMENU
	
4.1 Basic Modul Side Milling Cutter	
<ul style="list-style-type: none"> • Workpiece: Cylinder Trapezoid Prisma Half Angle Full Radius • End Faces: Plan Face Chamfer Corner Radius • Teeth: Standard teeth Staggered teeth Staggered/skipping teeth • Production / Regrinding Production by different infeed in several steps Regrinding with calculation of removal length, periphery and rake. Regrinding, finishing with different wheels • Main Fluting Meas. definition: Point-/ normal cut Grind direction: Forward / backward Optional spark out grinding 	<ul style="list-style-type: none"> • Periphery: Linear relief: 1st/ 2nd /3rd relief angle Radial relief: Cross-/ longitudinal Grind direction: Forward / backward Optional spark out grinding • Heel Grind proc.: Crosswise-/ longitudinal Production by different infeed (several steps) Grind direction: Forward / backward Optional spark out grinding • Face Relief: like end mills • Gashing, front/rear: like end mills • Chamfer front/rear: like end mills • Periphery Linear grinding: 1st / 2nd / 3rd clearance angle Arch grinding: cross / longitudinal • Grinding process Grinding direction: forward / backward Radius cutters can grind the peripheral chamfer in one go for the front and back.
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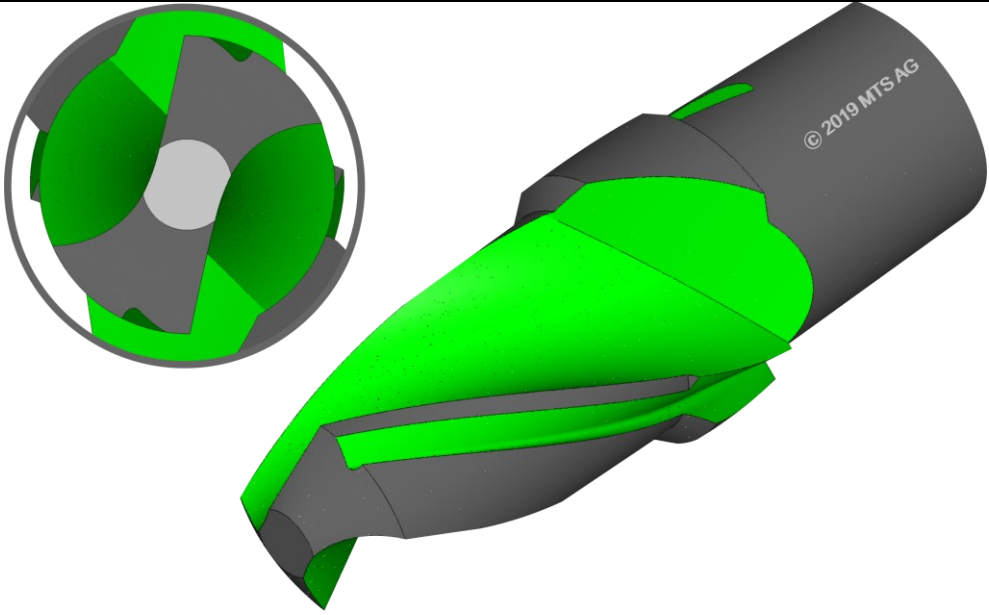
5.1 Burrs	DMENU
	
5.1 Basic Modul Burrs	
<ul style="list-style-type: none"> • Profile Construction: Free selectable sequence including: • Front: End face Point Chamfer Sphere Ball nose Enlarged radius Double radius • Middle: Cylinder Increasing taper Downgrade taper Convex radius Concav radius • Back: Cylinder Taper Radius • Standard Fluting: Cut to center Section fluting Two to center Groove cut • Double Cutting: Optional 	<ul style="list-style-type: none"> • Chip breaker: Optional • Grinding Direction: Forward Backward Bidirectional • Periphery: Optional • Alucut for Industrie-Burrs • Roughing teeth for bone cutters • Secondary flute • Drill point and milling face are possible.
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6.1 Drills	BMENU
	
6.1 Basic Modul Drills	
<ul style="list-style-type: none"> • Work Piece 2 or 3 teeth 1 – 5 Steps • Cutting Edge Combination: right helix/right cut left helix/left cut • Produktion / Regrinding Production by different infeed (several steps) Regrinding with calculation of removal length, periphery and rake. Regrinding, finishing with different wheels • Preparation: Separation Profile roughing Profile finishing • Point Standard Split point 2-facet point 4-facet point 6-facet point Delta – point M – point Kevlar – point Centring point Milling end face 	<ul style="list-style-type: none"> • 2nd Chamfer Optional: 2nd chamfer • 1st Web Thinning Correction of main cutting edge Correction of chisel edge S-web thinning (incl. Sumitomo like) Free constructed notchings / corrections • 2nd Web Thinning Correction of main cutting edge Correction of chisel edge • Main Fluting Meas. definition: Point-/ normal cut Grind. direction: Forward / backward Optional spark out grinding Separated fluting per step • Periphery Radial grinding / Round grinding Transverse/longitudinal positioning Linear relief: 1./2. relief angle • Steps Standard step (axial/radial relief angle) Step aperture angle: 45 - 200° Linear relief step (aperture angle $\geq 170^\circ$) • Chip Breaker 1 or 2 chip breakers per tooth • Production from standard- to step drill Special measurement and calculation program
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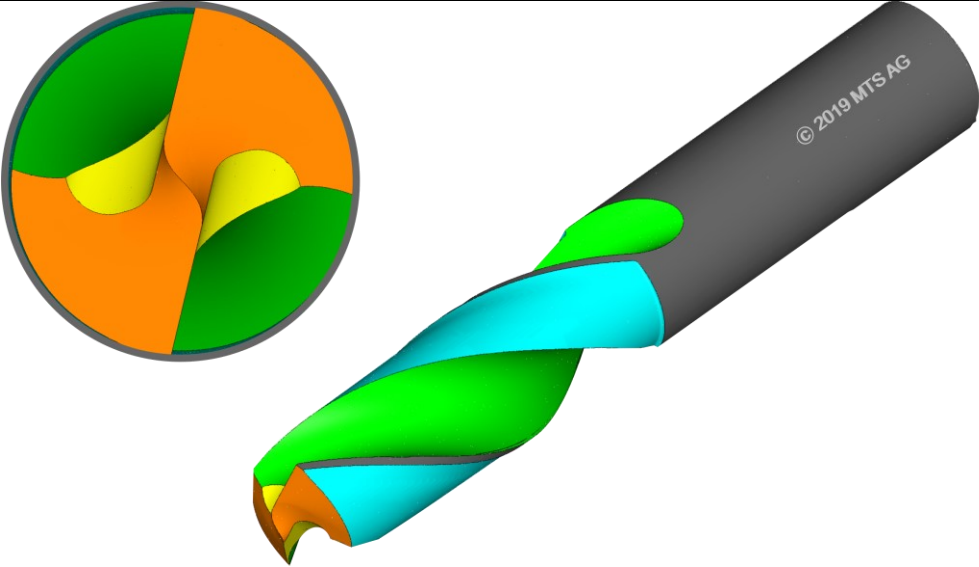


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6.2 Drills Subland Drills	BMENU
	
<p>6.2 Subland Drills Extension to 6.1:</p>	
<ul style="list-style-type: none"> • Specification according to Standard-/Stepping Drills • Secondary Fluting Defined rotation against main fluting Stufe 	
<p>mtsag.net</p>	



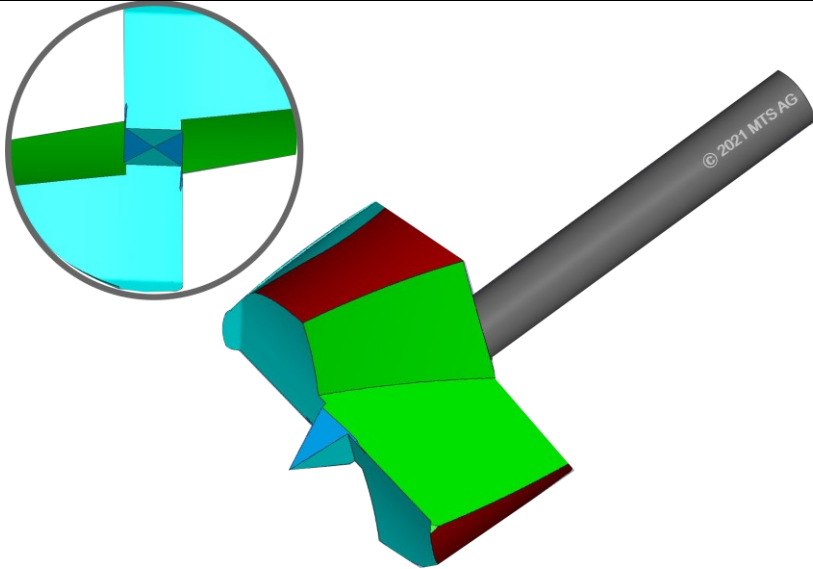
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6.3 Drills S-Point	BMENU
	
6.3 S-Point Extension to 6.1:	
<ul style="list-style-type: none">• S-Point: 2- and 3-Teeth	
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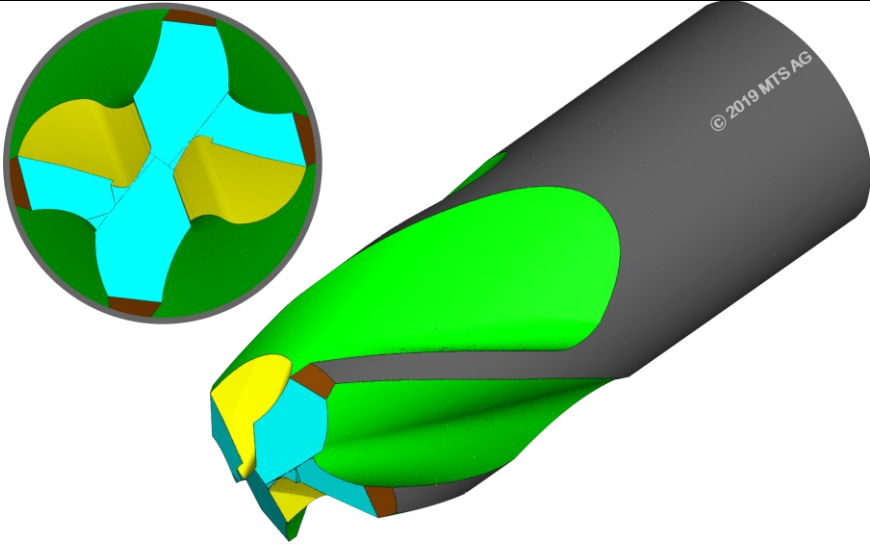
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6.4 Drills Woodworking Tools	BMENU
	
6.4 Woodworking Tools Extension to 6.1:	
<ul style="list-style-type: none">• Drills for woodworking: At the moment available:• Pin-drill• Forstner-drill	
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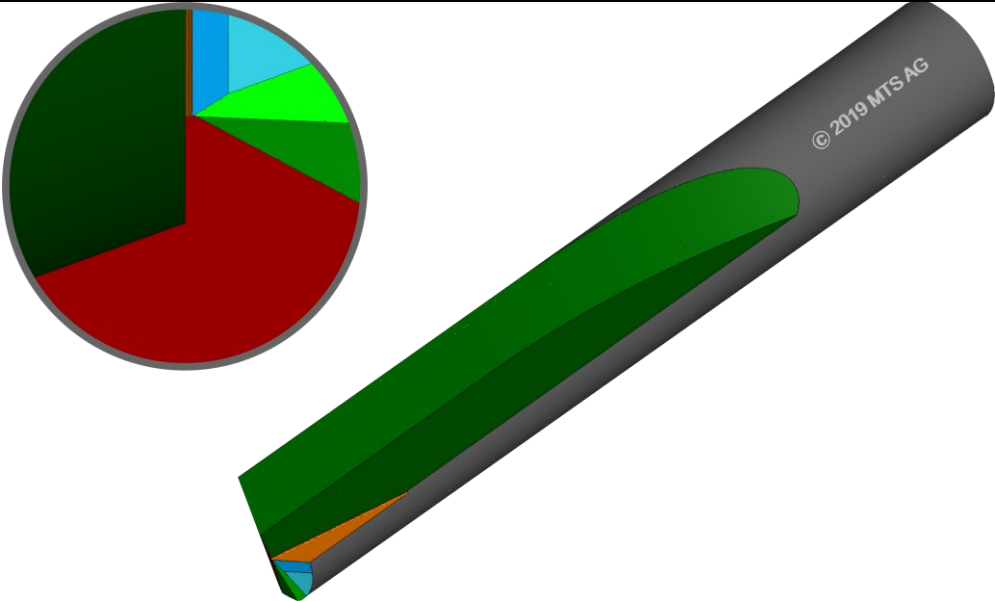
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6.Drills MTS-GIGA-4FL	5BMENU
	
<p>6.5 MTS-GIGA-4FL Extension to 6.1:</p>	
<ul style="list-style-type: none"> • Special point with 4 teeth / flutes: There are 4 main cutting edges, each including a 4-facet-points and a 4-facet-chamfer, splitted into two groups. The main group is constructed by a typical 4-facet-point while the secondary group is done by shortened teeth. (like a end mill tool with 2-to-center-geometry). • The two-stepped Giga-Drill is like a typical subland-drill-geometry. 	

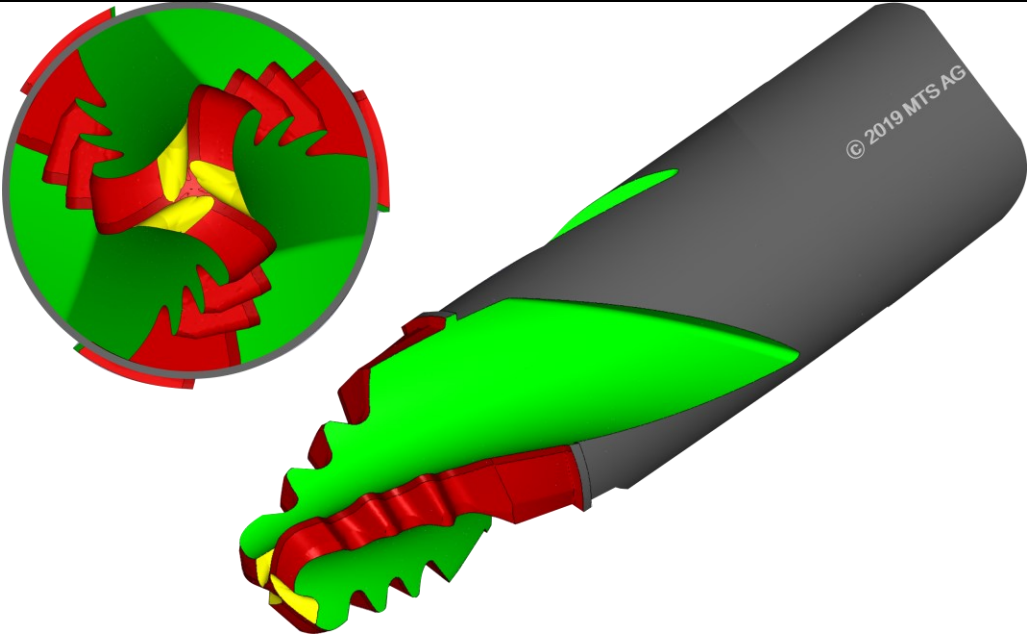
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7.1 Deep Hole Drills	TMENU
	
7.1 Basic Modul Deep Hole Drills	
<ul style="list-style-type: none"> • 1 and 2-Cutter • Preparation Cut-off Roughing • Point Clearance: Up to 5 different clearances • Chamfer: Optional: Chamfer grinding • Main Fluting: Straight Gashing • Secondary Fluting: Optional: Sec. flute • Web Thinning: Corrected main cutting edge Corrected chisel edge • Chamfer/edge rounding 	
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8.1 Profile Tools	SMENU
	
<p>8.1 Basic Modul „Increasing/Downgrade Profile “</p>	
<ul style="list-style-type: none"> • Workpiece: Tools with increasing and falling profile • Point and Geometry: Milling End Face like 1.1 Drills Point like 6.1 • Cutting Edge Combination: right helix/right cut left helix/left cut • Production / Regrinding: Production by different infeed (several steps) Regrinding with calculation of removal length, periphery and rake. Regrinding, finishing with different wheels • Profile: CAD-system for profile construction • Profile Element: Straight line Edge Convex / concave radius Chamfer Increasing / downgrade profile Free selectable sequence of the profile elements 	<ul style="list-style-type: none"> • Preparation: Separation (cut off) Profile roughing Profile finishing Straight polishing Corresponding to a defined blank profile • Main Fluting: Straight fluting Tapered fluting Spade drill fluting • Periphery: Linear relief: 1st/ 2nd /3rd relief angle Radial relief: 1st relief angle Cylindrical relief Raised land fluting Multi facet raised land fluting • Extension: Reading DXF-Format Reading an external created DXF-file Konverting into MTS-file-format autom. sorted elements autom. corrected sequence autom. corrected orientation Selecting the particular layer • DXF-Standard: AutoCAD Version 12 DXF-identification-code „AC1008“
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8.2 Profile Tools Multi Fluting Geometry		2SMENU
8.2 Multi Fluting Geometry Extension to 8.1:		
<ul style="list-style-type: none">• Multi Fluting Geometry: Up to 5 flutings with separate definition but common cutting edge		
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8.3 Profile Tools Radial Periphery		3SMENU
8.3 Radial Periphery Extension to 8.1:		
<ul style="list-style-type: none">• Radial Periphery: Radial periphery along discretionary sections Special grinding procedure by radius wheel		
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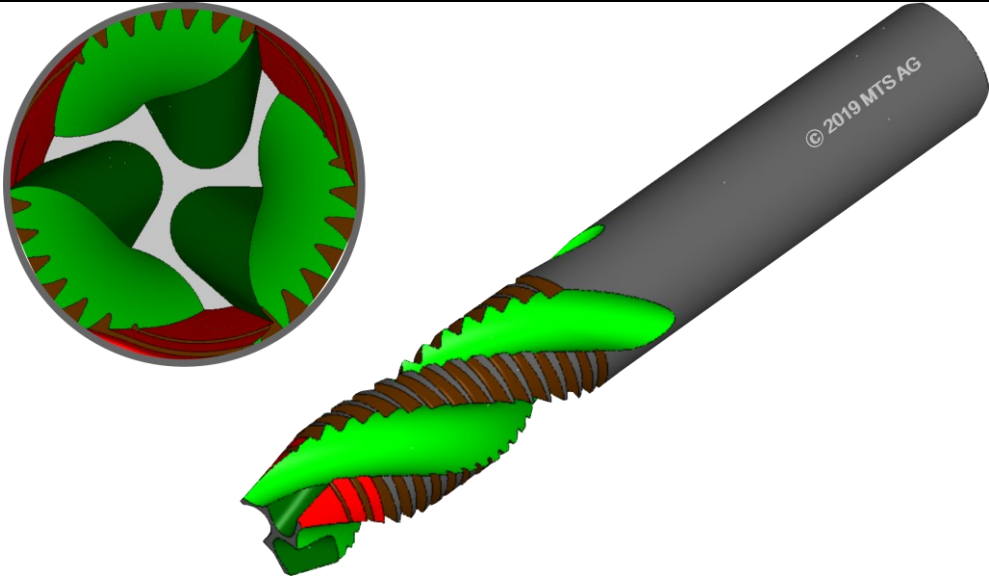
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8.4 Profile Tools Multi Cutter Geometry		4SMENU
8.4 Multi Cutter Geometry Extension to 8.1:		
<ul style="list-style-type: none">• Multi Cutting Geometry: Multi cutting tools with 2 Groups In pairs different cut geometry		
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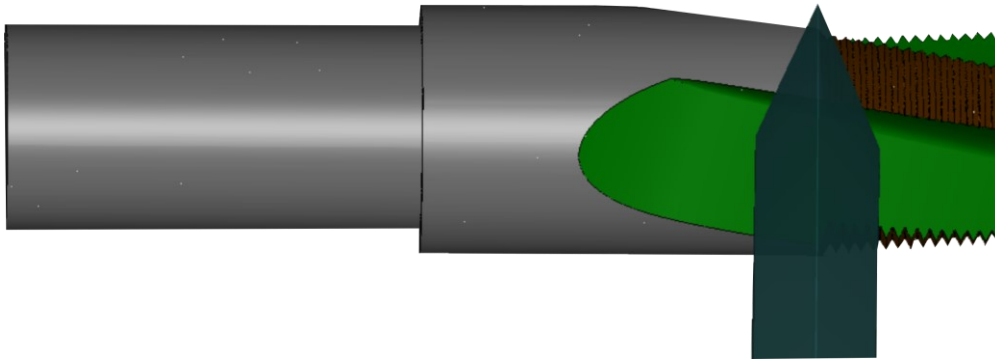
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9.1 Taps	1GMENU
	
9.1 Basic Modul Taps	
<ul style="list-style-type: none"> • End Face: Plan Face Centering Point Clearance Centering P. + Clearance Spigot • Cutting Edge Combination: right helix/right cutting left helix/right cutting left helix/left cutting right helix/left cutting • Preparation: Separation Profile roughing Profile finishing • Main Fluting: Using standard- or radius wheels • Chamfer: Type of grinding: longitudinal/transverse Chamfer angle Chamfer length Chamfer radial relief • Gashing: Radial cut angle Axial cut angle With radius- or rounded cup wheel 	
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9.2 Taps Produktion

2GMENU

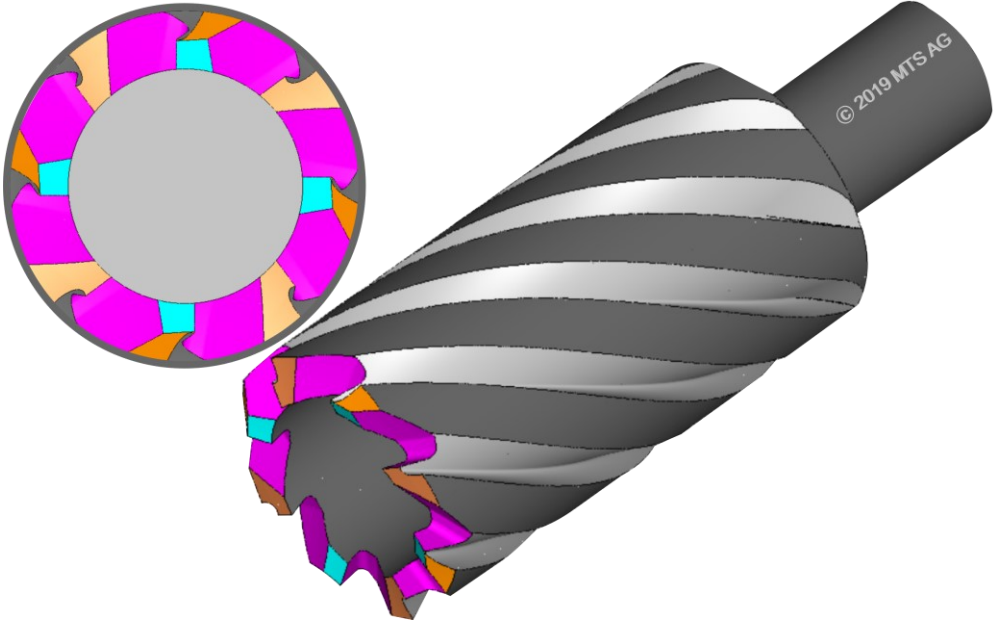


9.2 Taps Produktion Extension to 9.1

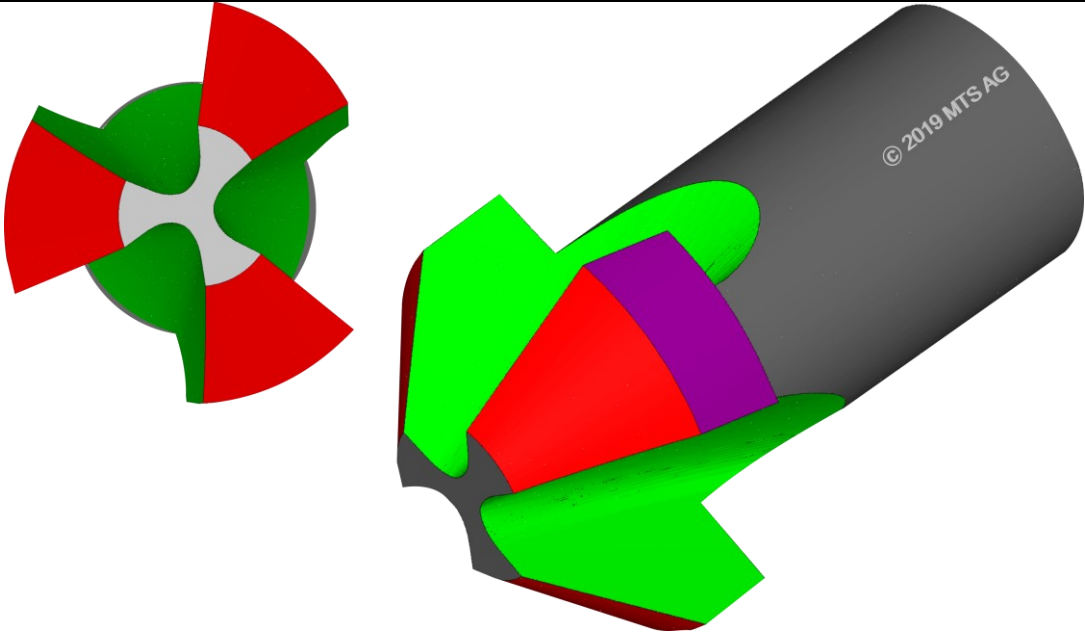
- **Tap production:**
Production by profile-wheel
(Wheel-definition by DXF- or point
discription)
Radial relief



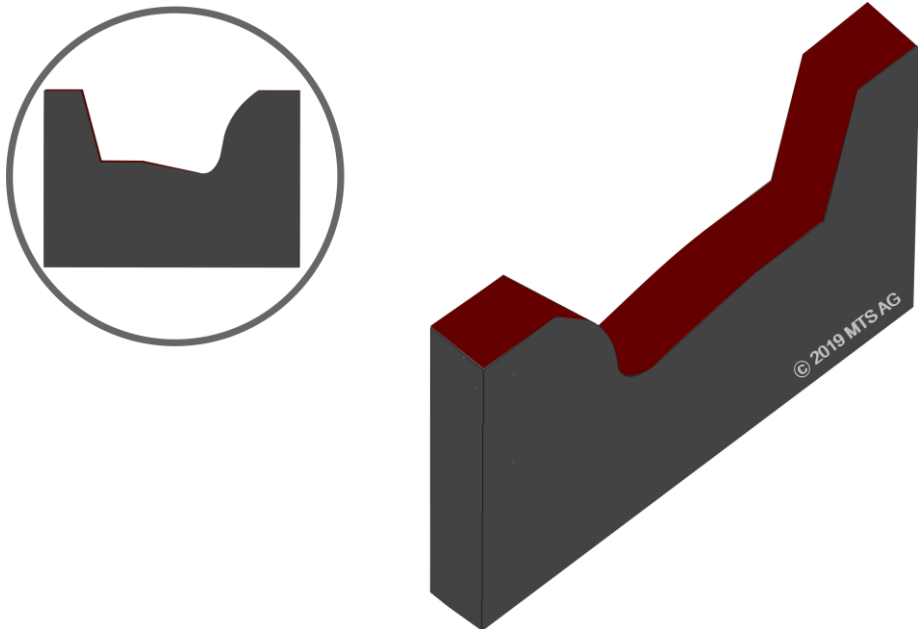
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10. Core Drills	KMENU
	
10.1 Basic Modul Core Drills	
<ul style="list-style-type: none"> • Workpiece: Cylindrical workpiece (like 1) • End Face: 1./2. relief angle Concavity Negat./posit. dish angle Outer cutting edge, inner cutting edge Regular/changing teeth geometry • Chamfer: 1./2./3. relief angle • Notching: 1 to 3 notchings per tooth Constructable cutting positions Roundings at entry and exit Variable aperture angle. • Radial relief grinding (Heel). 	
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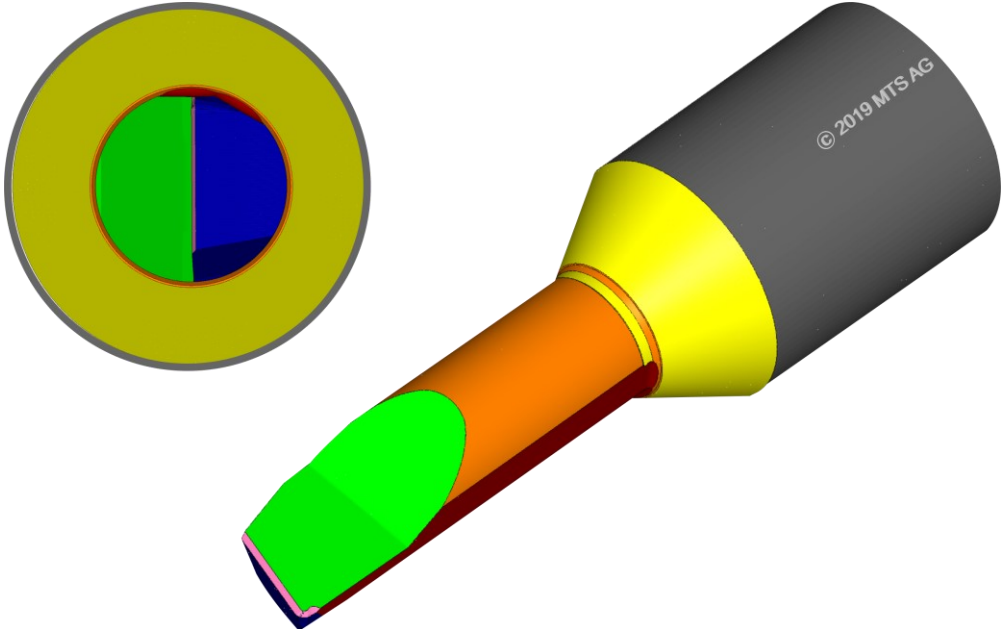
11. Countersink	CMENU
	
11.1 Basic Modul Countersink	
<ul style="list-style-type: none"> • Point: Plane • Cutting Edge Combination: right helix/right cutting left helix/left cutting • Production / Regrinding: Production by different infeed (several steps) Regrinding with calculation of removal length, periphery and rake. Regrinding, finishing with different wheels • Preparation: Separation Profile roughing Profile finishing • Fluting: Taper flute like end mills Counter flute with special grinding procedure • Chamfer: Axial/radial relief angle • Rear Section: Cylindrical grinding • Plane End Face 	
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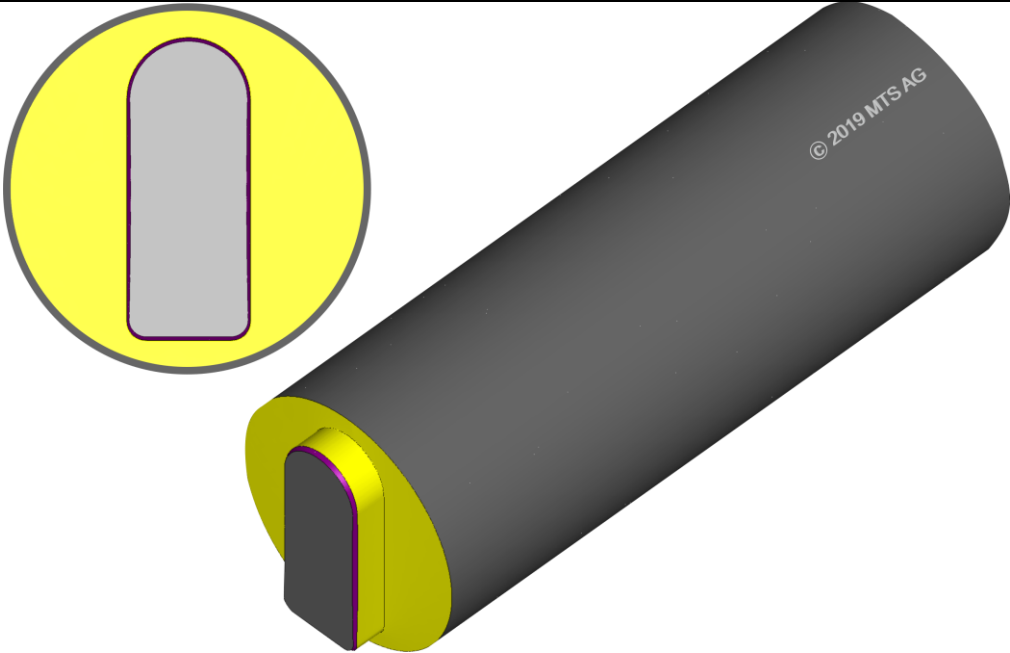
12. Profile Cutter	PMENU
	
12.1 Basic Modul Profil Cutter	
<ul style="list-style-type: none"> • Workpiece: Tools with free selectable profile • Profile: CAD-System for profile construction • Profile Element: Straight line Edge Convex / concave radius Chamfer Free selectable sequence of the profile elements • Preparation: Profile roughing Profile finishing • Lateral Clamping: Straight Helix Rake angle • Periphery: Axial part of relief Radial part of relief Free selectable grinding position per Element • Chuck Database • Profile definition on the plate or in the clamping. 	
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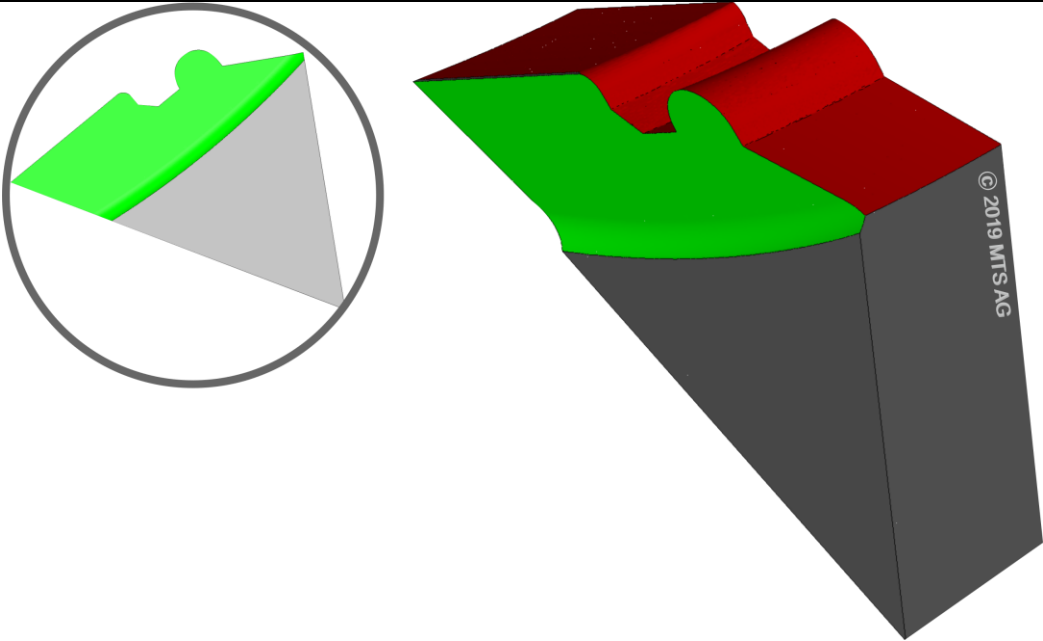
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13. Burins / Lathe Tool	IMENU
	
13.1 Basic Modul Burins / Lathe Tool	
<ul style="list-style-type: none"> • Workpiece: Tools with free selectable profile • Profile: CAD-System for profile construction • Profile Element: Straight line Edge Convex / concave radius Chamfer Free selectable sequence of the profile elements • Preparation: Profile roughing Profile finishing • Clamping: Frontal • Periphery: Axial part of relief Radial part of relief Free selectable grinding position per element • Main Fluting: Straight fluting Sec. gashing 	
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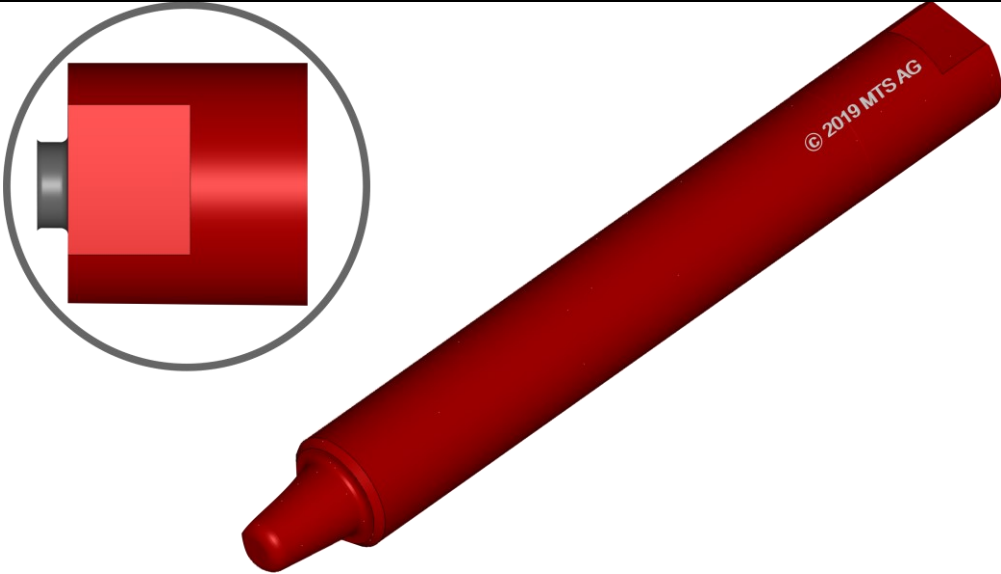
14.Punches	UMENU
	
14.1 Basic Modul Punches	
<ul style="list-style-type: none"> • Workpiece: Circular grinding of any radial profile Any axial profile (shank) • Profile: Standard profiles (integrated database) Special profiles by integrated CAD-System for profile-construction DXF-Import Centrical/excentrical profiles • Machining: Polygon-preparation Profile roughing Profile finishing Profile polishing • Grinding Procedure: Deep grinding Circular grinding (equal infeed) Circular grinding (dynamical infeed) Surface grinding. • Torx geometrie 	
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15.1 Cutting Inserts	WMENU
	
15.1 Basic Modul Cutting Inserts	
<ul style="list-style-type: none"> • Tool spectrum all convexe insert's profile outer surface with clearance / chamfering tools with longitudinal profile tools with transversal profile tools with frontal profile tools with profile combinations • Blank construction blank by standard selection-table blank by DXF-definition • Machining of outer surface Machinings: Roughing Finishing Polishing. • Procedures: Cylindrical grinding Linear grinding Plunging 	<ul style="list-style-type: none"> • Chamfering of outer surface Front chamfering Rear chamfering • Profile definition and machining Free constructed cutting profiles Orientation: Longitud., transversal, frontal Profile combinations • Preparing of profile cutting edge: Roughing Finishing Chamfering of cutting edge • Flute machining Two different procedures: Logitudinal grinding Transversal grinding (scalping) • Recessing and special features Creating recesses and special geometrical elements will be done by MTS-module „Open Procedure“.

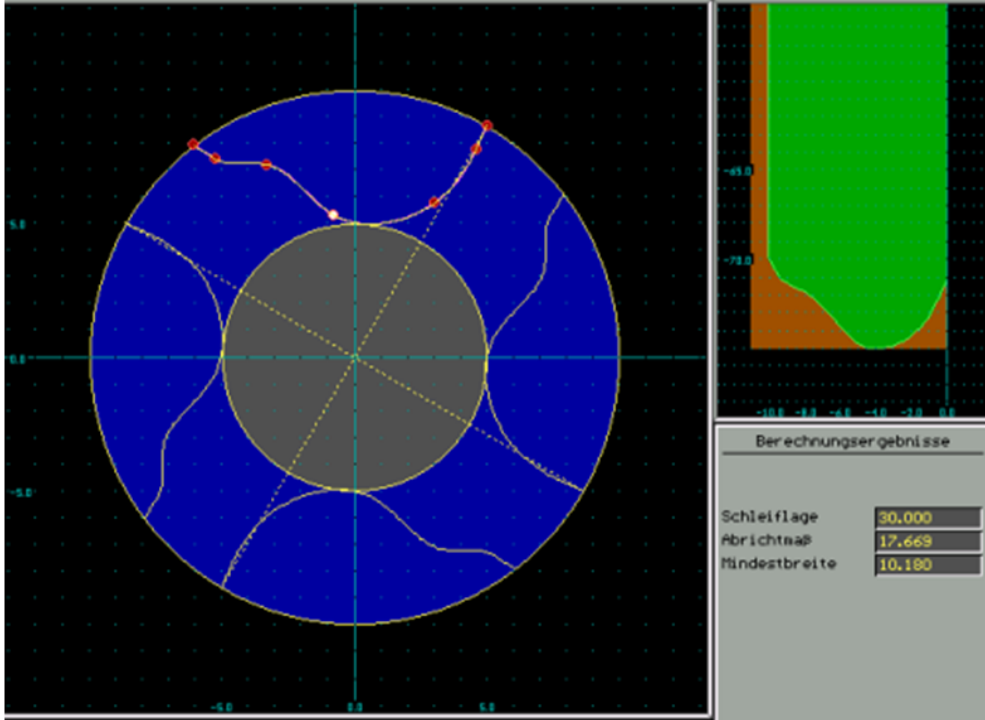


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16.1 Preparation / Profile Processing	VMENU
	
<p>16.1 Basic Modul Preparation / Profile Processing</p>	
<ul style="list-style-type: none"> • Preparation • Separation: Round Grinding / Depth Grinding • Point Machining: Full Point / Centring Point With / no oscillation • Chamfer: Round Grinding / Depth Grinding With / no oscillation • Slot: (Cooling Channel Connection) • Clamping Surface: Form B, 1 Land Form B, 2 Land Form E_1 Form E_2 • Profile Machining Increasing / downgrade profiles • Operations Roughing Finishing Polishing • Type of End Face: Plane Point Centering point 	
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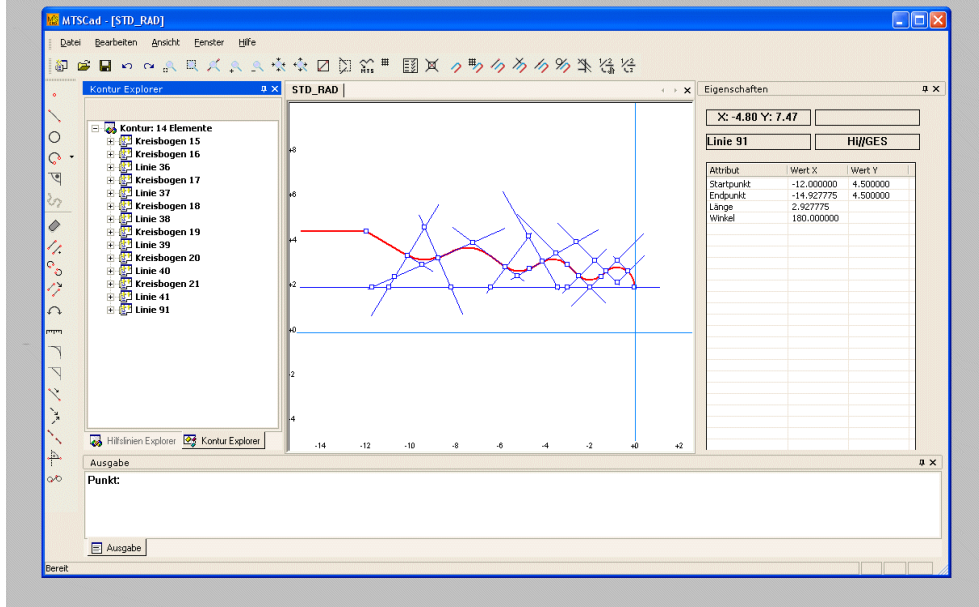
Options	
17.1 Construction of Flute Profile / Wheel Profile	Options for FMENU / BMENU
	
17.1 Basic Modul Construction of Flute Profile / Wheel Profile	
<ul style="list-style-type: none"> • Construction of Flute Profile: • Construction by integr. CAD • Calculation of wheel-profile • Calculation of grinding track • Intersection simulation • Output of wheel discription 	
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18.1 CAD Modul

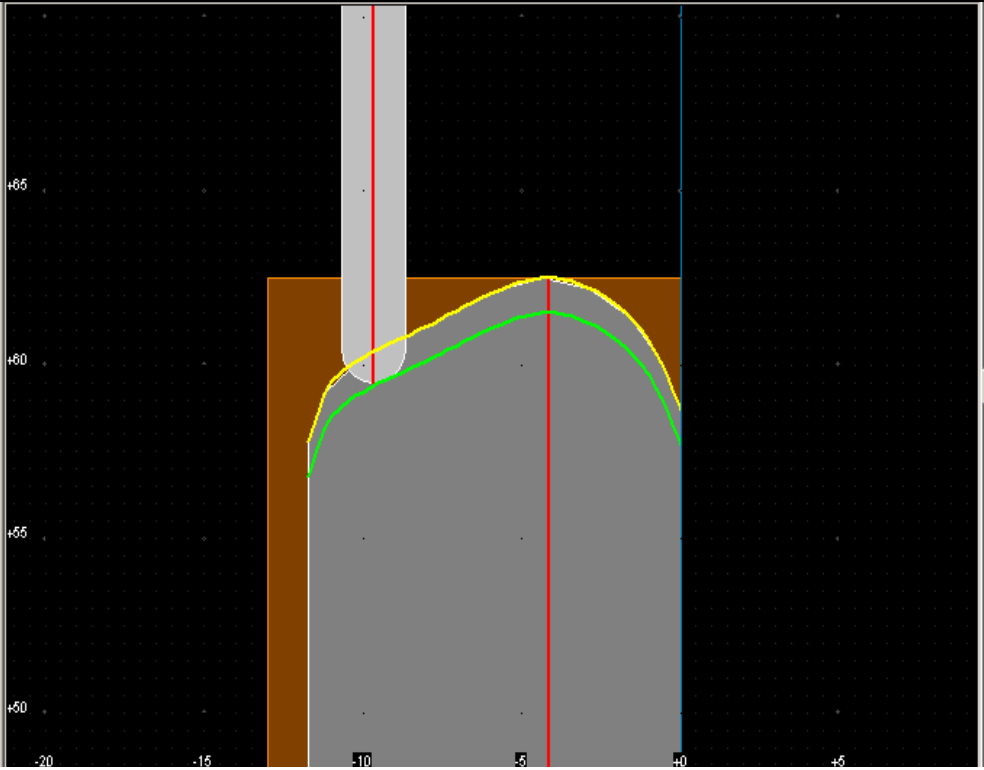
Option CAD



18.1 CAD Modul

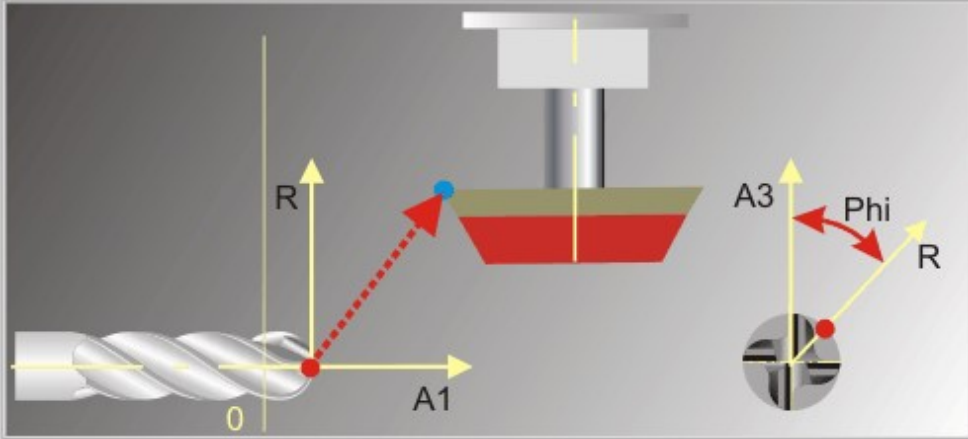
- CAD-Program spezilized to the usage of tool-construction including interface to the grinding-modules.



19.1 Dressing Cycle / Wheel Profile	Option
	
<p>19.1 Dressing Cycle / Wheel Profile</p>	
<ul style="list-style-type: none"> • Wheel dressing: • Input of dressing parameter within machine world • Calculation of dressing cycle driven by given wheel profile (Pos. 19) 	
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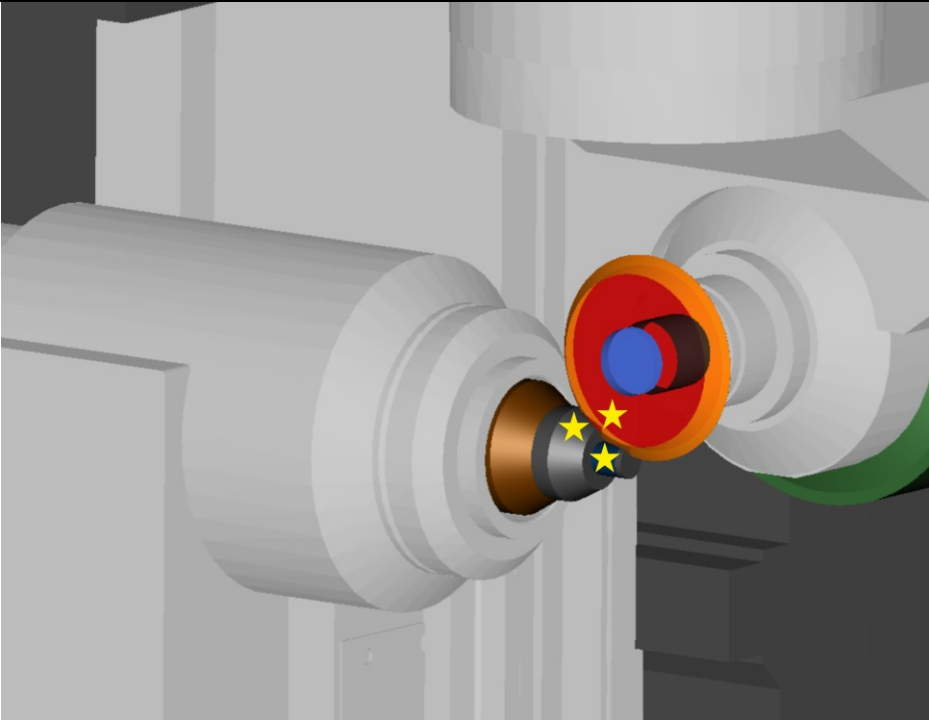
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20.1 Open Procedure Genrerator	Option für alle Module
	
<p>20.1 Open Procedure Genrerator Construction and generating of selfmade additional operations. Integration at any operation-position.</p>	
<ul style="list-style-type: none"> • Generating of open procedures: • Graphical construction of open procedures • Up to 10 different additional operations per modul • Import/Export by global database • Inserting at any position within machining order • Seperate wheel and technology to each open procedure • Movement- and intersection-simulations 	



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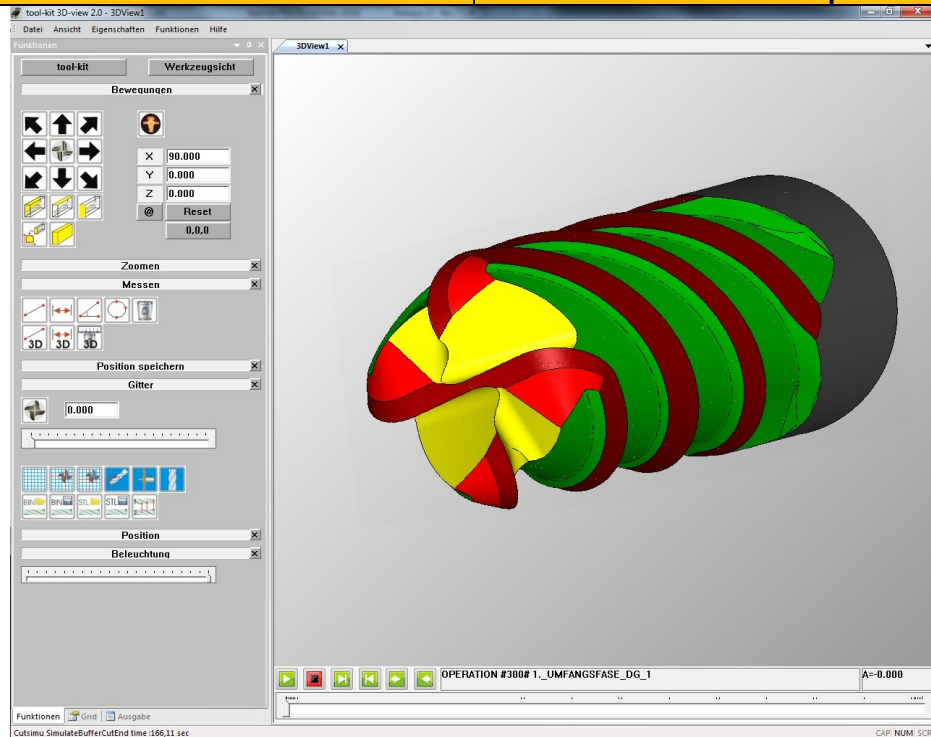
21.1 Basic Modul CNC-Collision-Control	Option for all Moduls
	
21.1 Basic Modul CNC-Collision-Control	
<ul style="list-style-type: none"> • Functions: NC_start without collision-control NC_start with collision-control and auto stop at first collision. NC_start with collision-control and collision protocol of all situations NC_simulation without collision display NC_simulation with collision display • Extended CNC-Generator: Collision-control: Yes / No Mode-selection: „Stop at first collision“ / “All collisions“ • Mode „Stop at first collision“: The modul stops the calculation of the CNC-code by recognition of the 1st collision and shows these graphically on the scope • Mode „All collisions“: First the CNC code will be calculated completely. Subsequently we will have a listing of all collision situations. In the following these can be individually plotted and examined. 	<ul style="list-style-type: none"> • Administration of the collision objects (Setup): 4 object lists: Basical objects, tool-objects, clamping- and spindle-objects. The list administration takes place in each case by inserting, copying, renaming or deleting. The selection of the objects which can be considered concerning the collision takes place via activating in the object lists. • Collision calculation: Examining the penetration of all activated objects, as well as the active grinding wheel outside of the workpiece. Generating the collision protocol.
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22.1 tool-kit 3D-view 2.0

Option for all Moduls



22.1 Basic Modul tool-kit 3D-view 2.0

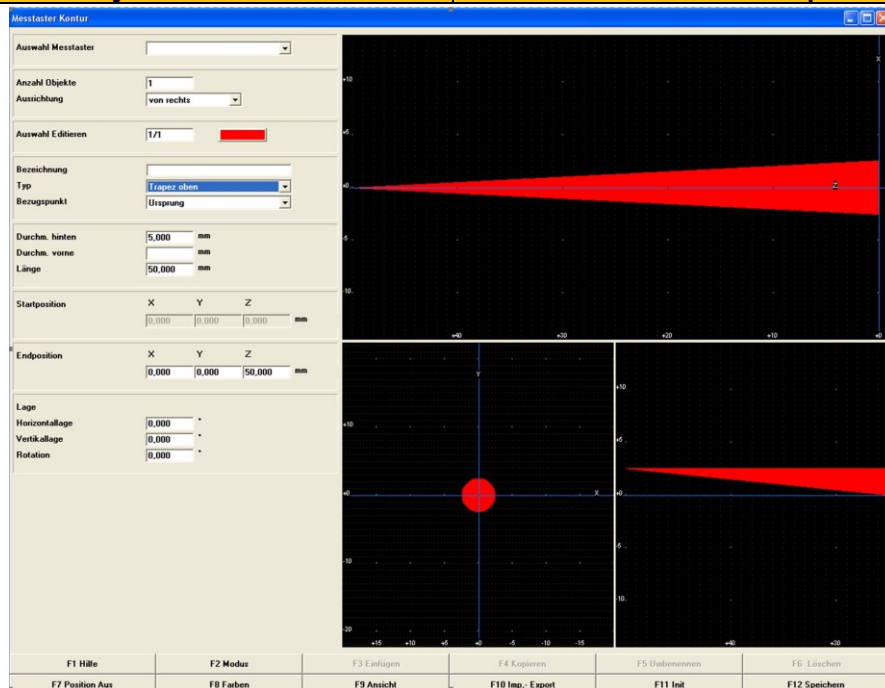
- Tool-simulation in 3D**
 Integrated call of 3D-simulation from all moduls including 3D simulation view
 Positioning of the workpiece in three Rotary axes (3D view).
 Save 3D views.
 2D grid and 2D measurement (distance, angle, radius).
 3D measurement (points, distance).
 Section plane display
 Snap2Point feature.
 Refining function for cutouts.
 Transparency view
 Adding operations (not everything new count).
 Loading STL blanks.
 Save as STL file. Display of STEP files



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23.1 Measurement-Cycles

Option for all Moduls

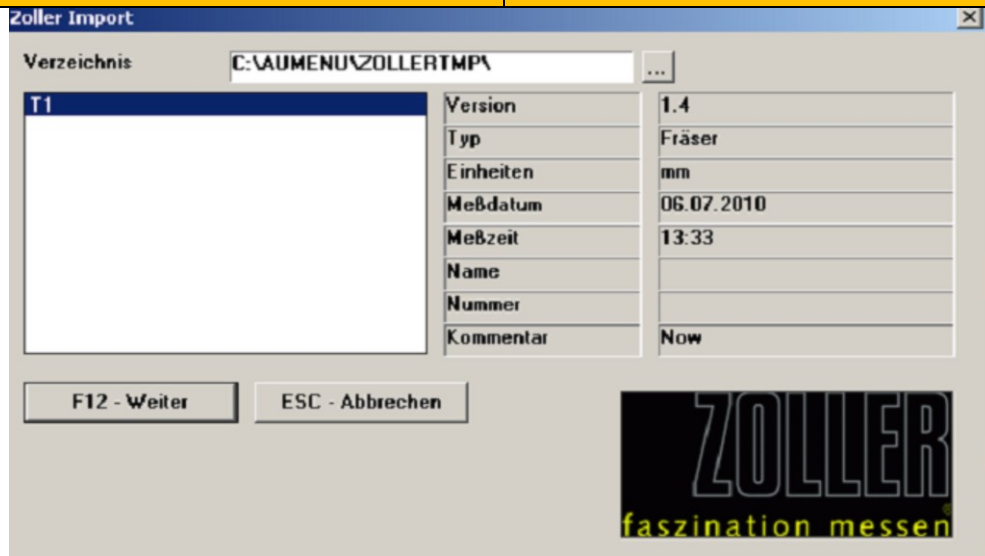


23.1 Basic Modul Measurement-Cycles

- **Measurement-Cycles for 3D-probing-system**
Length
Tooth-positioning
Helix lead (zylindrical, conical)
Diameter (zylindrical, conical)
Teeth-indexing



24.1 MTS-interface to an external Measurement-Machine



24.1 MTS-interface to an external Measurement-Machine

- Interface within tool-kit PROFESSIONAL to a measurement-machine (Exp. Zoller genius 3).
- Exchange of geometry data between MTS software and a measuring machine.
- Measurement of workpiece data and wheel geometry
- Reading back the measured datas
- Decision for further processing.

- Measurement-data will be read and analysed by the error-handling-procedure.
- The generated correction-data will be used in order to come to correct must values at next grinding step.
- Correction Options:
- **Correction on the wheel data:**
Reasonable corrections f.e. at diameter, rake-angle and wheel-distance.
- **Using the operation-specific correction table:**
Corrections at machine-data or wheel-data.
- **Correction of tool parameter:**
Correction in inverse direction to the actual value and setpoint.