

Grinding wheels for inserts and cutting-tool production

The EHWA range for inserts, rotary and micro tools, taps, burrs, saw blades, hobs and broaches, including bonds, specifications and application examples.



EHWA Europe GmbH

www.ehwadia.de

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From the workpiece to the right grinding wheel

Diamond and CBN tools for profiles, surfaces and cutting edges

EHWA offers grinding wheels for producing and machining a range of cutting tools. These include periphery and top-and-bottom grinding wheels for inserts, hybrid and precision wheel packs for rotary tools, and tool-grinding wheels for tipped circular saws. The range also covers taps, burrs, HSS saw blades, hobs and broaches.

The cutting tools are distinguished by their workpiece material: high-speed steel, carbon steel, ceramic, carbide and PCD/PCBN materials. Tungsten-containing cemented-carbide tools are a major application. Workpiece material, abrasive and bond are selected separately; the HSS profile-grinding example explicitly specifies CBN.

Workpiece / operation	EHWA tool family
Insert periphery	Periphery wheels
Insert top and bottom surfaces	Top & Bottom wheels
Rotary tools	Hybrid wheel packs
Micro rotary tools	Precision wheel packs
Tipped circular saws	Tool-grinding wheels



Periphery grinding wheels for inserts.



Ring-shaped top-and-bottom grinding wheel for inserts.



Another top-and-bottom grinding-wheel design for inserts.



Hybrid wheel pack for rotary tools.



Precision wheel pack for micro rotary tools.



Tool-grinding wheels for tipped circular saws.



Insert and grinding wheel during machining.



Detail of a grinding-wheel contact surface.

Inserts: periphery, top and bottom

The range includes grinding wheels for carbide, ceramic, cermet and PCD/PCBN inserts. Tool design, cycle time and dressing interval are considered together. The aims are uniform insert geometry, a fine surface finish and small cutting-edge chips.

Operation	Stated benefits	Machine examples
Periphery grinding	Shorter cycle times with suitable high feed rates; small chips; longer dressing intervals	Agathon, Wendt, Waida, Ewamatic, Ewag
Top-and-bottom grinding	Shorter cycle times; longer dressing intervals; improved dimensional stability	Stahli, Peter Wolters, Wendt WBM, Agathon T&B, Fujisanki



Periphery wheel for the insert contour.



Grinding wheel for insert top and bottom surfaces.



Grinding wheel and insert as tool and workpiece.



Different insert workpieces.

Bond selection by application

The selection matrix contains the bond designations for periphery and top-and-bottom grinding. It distinguishes standard resin, high-performance resin and hybrid bonds, with an additional qualitative bond-strength direction for PCD/PCBN.

Bond selection for inserts

Product		Low content  High content						
Periphery	PCD	Lower hardness			VDGF		Higher hardness	
	PCBN				VHGN			
		High-performance resin				Hybrid		
	Carbide				BXT	SA2	XA20	BMX series
	Cermet				SA4		RM series	
	Ceramic	BXB	BXC					
Top & bottom		Standard resin			High-performance resin			
	Carbide				BQ / BG		BXS4	SA5
	Cermet							
	Ceramic	B26						

Qualitative selection matrix; constituent content is not specified.

Complete bond selection with all material rows, bond families and manufacturer designations.

The matrix lists VDFG for PCD and VHGN for PCBN. The periphery-grinding section contains BXB, BXC, BXT, SA2, SA4, XA20, BMX series and RM series. The top-and-bottom section contains B26, B32, BQ / BG, BXCM, BXS4 and SA5. The positions and shared areas of these designations remain visible in the matrix.

The upper arrow is labelled "Low content / High content". The constituent concerned is not identified; the appropriate bond is selected using the complete workpiece-material specification.

Three insert-grinding application examples

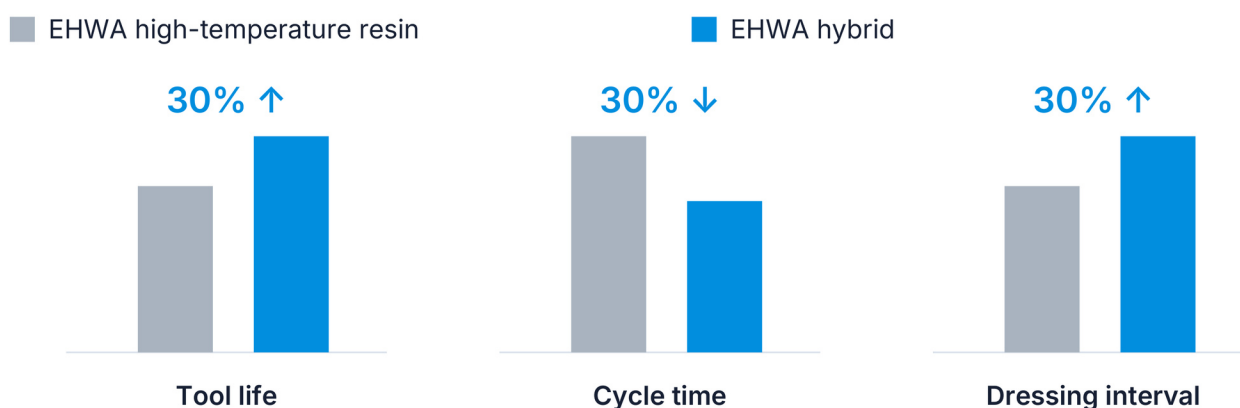
For periphery grinding, EHWA describes high-temperature polyimide bonds together with hybrid and soft metal bonds. The design combines shorter cycle times, small chips, dimensional stability and productivity. The following examples concern different workpieces and tool designs.

1. Carbide inserts on Wendt

Trial specification	Design
Machine	Wendt 715 WAC Quattro
Workpiece	Carbide insert
Wheel speed	20 m/s
Wheel specification	RD-11A2, 400D-39T-10W-6X-355.06H
Compared designs stated by EHWA	D46 high-temperature resin bond; D40 hybrid bond

In the illustrated comparison, EHWA states **30% longer tool life**, **30% shorter cycle time** and a **30% longer dressing interval** for the hybrid design compared with the high-temperature design shown.

Carbide: two EHWA designs



Illustrated application example; relative comparison bars.

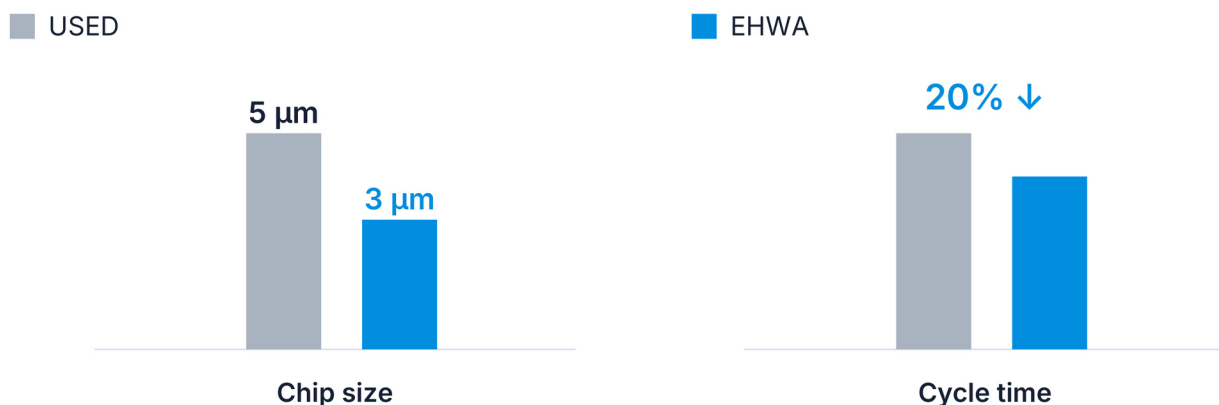
Carbide example: tool life, cycle time and dressing interval of the two EHWA designs.

2. PCBN inserts on Agathon

Trial specification	Design
Machine	Agathon
Workpiece	PCBN insert
Wheel speed	18 m/s
Wheel specification	VD-11A2, 400D-39T-15W-6X-355.06H
Designation	D6M120VHGN

The illustrated chip size is **5 µm** for the comparison design labelled USED and **3 µm** for EHWA. The example also states a **20% shorter cycle time**.

PCBN: chip size and cycle time



Illustrated application example; relative comparison bars.

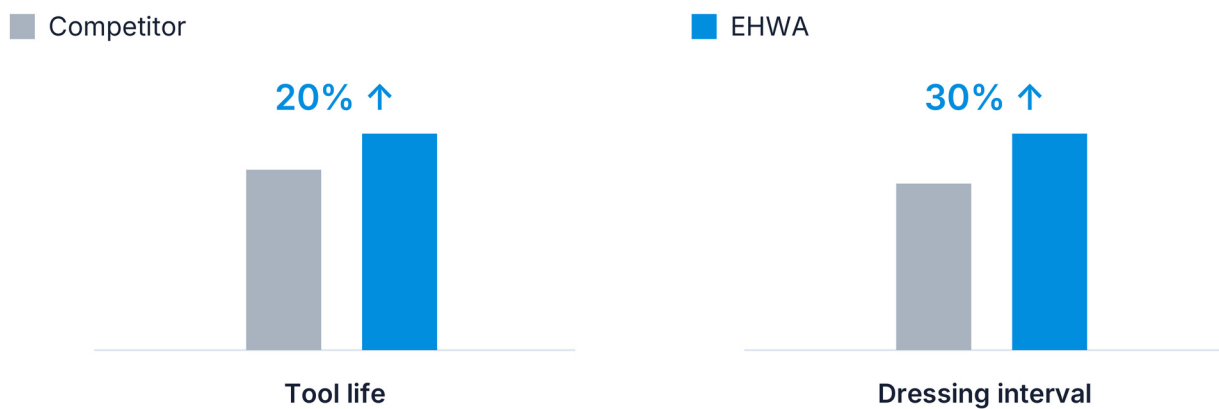
PCBN example: chip sizes of 5/3 µm and a 20% shorter cycle time.

3. Top-and-bottom grinding of different carbide inserts

Trial specification	Design
Machine	Wendt WBM221-Duo Lift
Wheel	RD-2A2T, 501D-5X-40W, D126BXS4
Workpiece	Different carbide inserts
Coolant	Oil

In the illustrated comparison with a competitor's tool, EHWA states **20% longer tool life** and a **30% longer dressing interval**.

Top-and-bottom grinding: competitor and EHWA



Illustrated application example; relative comparison bars.

Top-and-bottom example: tool life and dressing interval compared with the competitor's tool.

Each result refers to the designs and trials shown.

Rotary tools: polyimide, hybrid and porous structures

For rotary tools, EHWA describes polyimide bonds as more thermally stable than phenolic or epoxy bonds within the tool-grinding range considered. This stability supports grinding performance and tool life.

Hybrid bonds combine polyimide and metal bonds. The design combines the grinding performance and elasticity of polyimide with the wear resistance and thermal stability of the metal component.

A porous hybrid structure supports diamond protrusion and improves coolant access. Lower grinding load can enable suitable higher feed rates and reduce cycle time.

Bond programme	Stated properties	Series designation
Phenolic bond	Free-cutting behaviour; good elasticity	-
Standard polyimide bond	Good thermal stability and edge stability	BX series
High-performance polyimide bond	High thermal stability; fine surface quality	PA series
Hybrid bond	Shorter cycle time through high feed; low grinding load	BMX series

Bond programme for rotary tools

Phenolic Free cutting Good elasticity	Standard polyimide Good thermal stability Edge stability BX series	High-performance polyimide High thermal stability Fine surface finish PA series	Hybrid High feed Shorter cycle time Low grinding load BMX series
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Properties of the illustrated EHWA range.

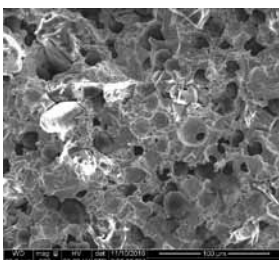
Bond programme from phenolic through standard and high-performance polyimide to hybrid.



Hybrid wheel pack for rotary tools.



Precision wheel pack for micro rotary tools.



Porous hybrid structure with instrument information and scale retained.



Additional view of the hybrid wheel pack.



Additional view of the precision wheel pack.

Drills and end mills: spindle-load comparison

Trial specification	Value
Machine	ANCA FX7 (19 kW)
Workpiece description	Carbide $\Phi 12$ -50mm (LOF), 2 flutes (K10)
Wheel speed	18 m/s
Feed rate	120 mm/min
Depth of cut	2.4 mm

The notation $\Phi 12$ -50mm (LOF) comes from the trial sheet. Diameter and length specifications are agreed separately for the particular tool design.

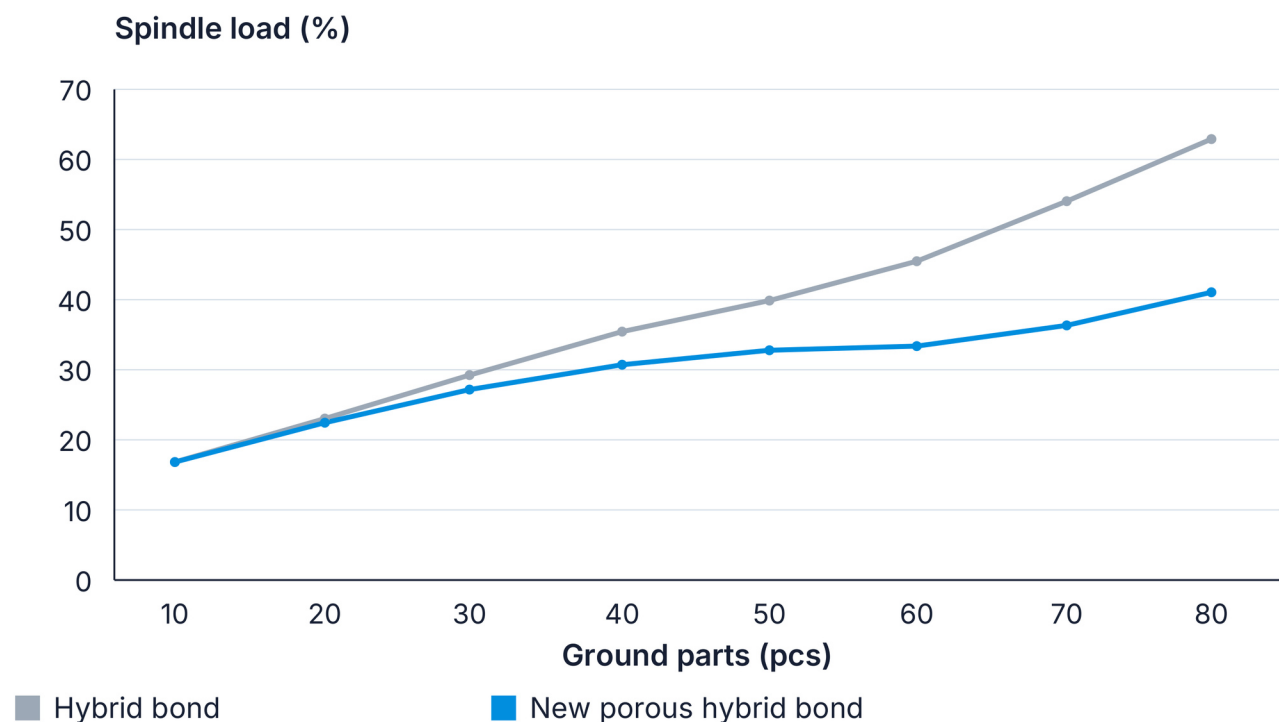


Grinding a rotary tool with a wheel pack.



Machining setup from the drill/end-mill example.

Drills / end mills: spindle load



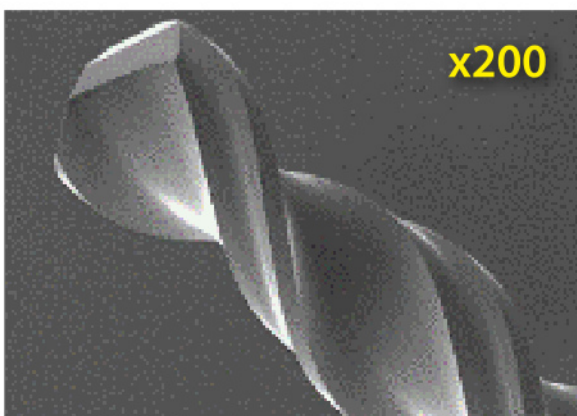
Curve geometry follows the application example.

Spindle-load comparison: hybrid and new porous hybrid bonds over the number of ground parts.

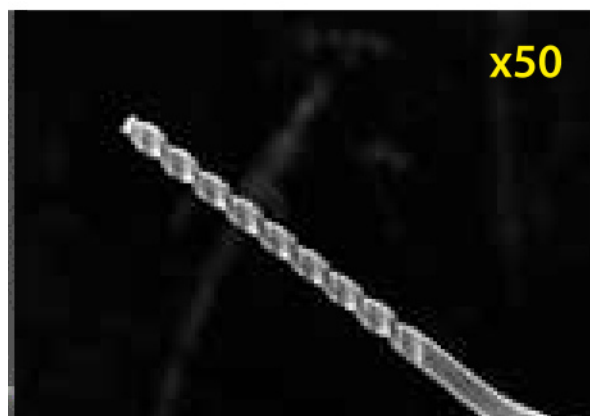
In this example, the curves show a lower spindle load for the new porous hybrid bond at the same part count. The axes indicate spindle load as a percentage and the number of ground parts.

Precision and micro rotary tools

For precision tools, EHWA states high productivity with low tooling costs, improved surface and cutting-edge quality, and accurate edge stability. The micrographs show two tool examples at the stated magnifications.



Micro rotary tool, magnification ×200.



Micro rotary tool, magnification ×50.

Taps and burrs

Application	Tool type / specification	Function
Taps	VB-1A1	Grinding
Taps	R/D-RR	Dressing
Burrs	MD-1V1; 110D-160D / 30V-60V; ME4 series	Grinding tool and bond series

The D/V notation in the burr specification is retained as a manufacturer designation; the tool drawing defines the particular design.



Grinding wheel for tap production.



Detail of the tap-grinding wheel.



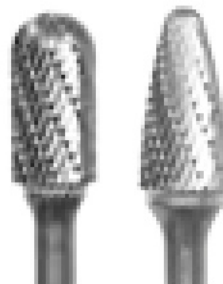
Rotary dressing tool for the tap application.



Grinding wheel for burrs.



Detail of the burr-grinding wheel.



Two burr workpiece examples.

Tipped circular saws: flank, top and face

For tipped circular saws, EHWA states long tool life, shorter cycle time, fine surface finish and high dimensional stability. Three grinding surfaces are distinguished: flank, top and face.



Tool-grinding wheels for tipped circular saws.



Detail of a saw-blade grinding wheel.



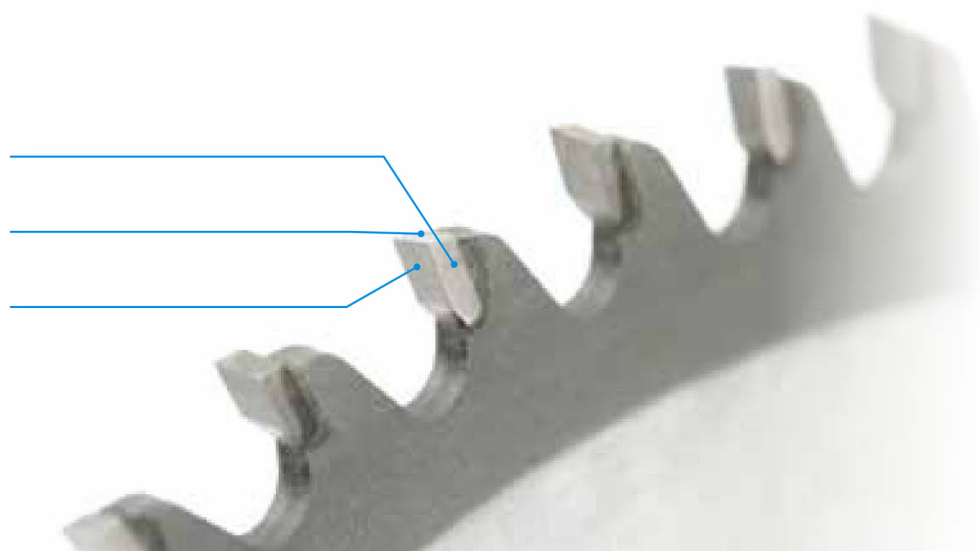
Carbide-tipped saw blade as the workpiece.

Tipped circular saw: three grinding surfaces

01 Flank grinding

02 Top grinding

03 Face grinding



Carbide-tipped saw blade; contact points follow the source photograph.

Flank, top and face grinding on the actual saw-blade photograph.

Workpiece	Grinding surface
Carbide-tipped circular saw	Flank
Carbide-tipped circular saw	Top
Carbide-tipped circular saw	Face
HSS saw blade	Profile



Grinding wheel for flank grinding of tipped saws.



Grinding wheel for top grinding.



Grinding wheel for face grinding.



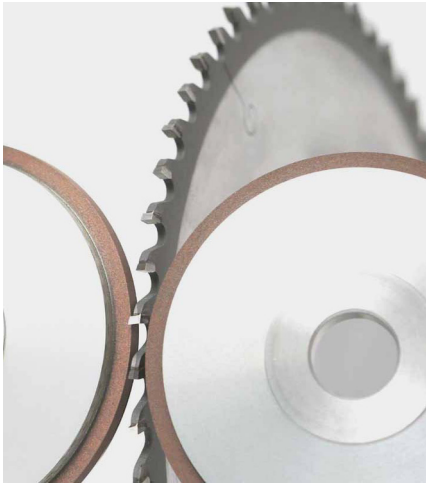
Grinding wheel for profile grinding of HSS saw blades.

HSS profile grinding, hobs and broaches

For profile grinding of HSS saw blades, EHWA specifies **RB-14F1/S**, **CBN107** and a hardened resin bond. The complete selection contains two D groups with the same five combinations:

Type	D	x1	x2	U	Bond type
RB-14F1/S	150	6	8	1; 1.3; 1.6; 2; 2.5	Hardened resin bond
RB-14F1/S	150	6	10	3	Hardened resin bond
RB-14F1/S	150	8	12.5	3.5	Hardened resin bond
RB-14F1/S	150	8	12.5	4	Hardened resin bond
RB-14F1/S	150	10	15	5; 6	Hardened resin bond
RB-14F1/S	200	6	8	1; 1.3; 1.6; 2; 2.5	Hardened resin bond
RB-14F1/S	200	6	10	3	Hardened resin bond
RB-14F1/S	200	8	12.5	3.5	Hardened resin bond
RB-14F1/S	200	8	12.5	4	Hardened resin bond
RB-14F1/S	200	10	15	5; 6	Hardened resin bond

D, x1, x2 and U are the selection's dimensional designations. The binding dimensional definitions and units are agreed using the tool drawing.



Saw-blade profile grinding with grinding wheels.



Hob-grinding application example.



Broach-grinding application example.

Discuss your cutting-tool production

Specify the cutting tool, workpiece material and surface to be ground. Add the drawing, machine, mounting arrangement, current grinding wheel, coolant and required cutting-edge quality. For an existing process, cycle time, dressing interval, chipping and wear pattern are useful.

The tool design combines grinding performance, dimensional stability and useful tool life. The information available is sufficient to start; further details can be added during the technical discussion.

EHWA Europe: info@ehwadia.de · +49 6173 997780

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