

BEARINGS AND MECHANICAL ENGINEERING

Bearing machining

Grinding, superfinishing and dressing



Tools for bearing rings and selected rolling elements

Precise surfaces, suitable contours and cost-effective production: EHWA brings together grinding tools, CBN honing stones and dressing tools for key machining tasks in the bearing industry.

This brochure connects the bearing component with the appropriate tool family. It presents applications, tool designs and technical catalogue examples, from bearing ring grinding and raceway superfinishing to tapered roller end-face machining.

From your application to the tool solution: understand the component, identify the process, coordinate the tool design.

Bearing rings

Raceways

Dressing tools

From the surface to the process

Inner rings, outer rings and rolling elements place different demands on machining, depending on bearing type. Selection starts with the specific surface: a bore, raceway, rib or end face. Tool design and machining process are then assessed together.

Your task	Tool or process	Page
Grind the inner ring bore or raceway	Vitrified-bond CBN grinding wheels	3
Grind the outer ring raceway, ribs or end faces	Vitrified-bond CBN grinding wheels	3
Superfinish a raceway	CBN honing stones for superfinishing	4
Generate a grinding wheel profile	Profile dressing rolls	5
Dress a wheel for internal grinding of bearing rings	Metal-bonded cup dressers	5
Machine end faces of rings, rollers or needles	Face or double-disc grinding	6
Machine tapered roller end faces	Grinding tools for the horseshoe process	6

Consider quality and productivity together

Tool assessment includes surface parameters, dimensional and form tolerances, machining time and tool life. Longer tool life can reduce tool changes; adapted stock removal can improve cycle time. The intended component quality remains the benchmark.

The following catalogue examples illustrate specific technical relationships. Their values belong to the application stated. The tool solution for your production is developed using the bearing type, drawing, machine and machining objective.

Component - surface - process - tool



Bearing ring grinding

Vitrified-bond CBN grinding wheels form a tool family for bearing ring machining. EHWA shows applications on the inner ring bore and raceway, and the outer ring raceway, ribs and end faces. Tool geometry follows the surface and machine mounting requirements.

Stock removal, surface finish and loading

The EHWA catalogue describes high stock removal rates, lower grinding forces and reduced mechanical and thermal loading of the workpiece. A suitable design can support short machining times and lower loading of the workpiece and spindle. Surface finish, cylindricity and dimensional accuracy are central quality objectives.

A coordinated dressing process maintains the grinding profile and working surface of the wheel. Grinding wheel, dressing tool and machine are therefore assessed together.

Bodies and tool designs

Catalogue illustrations show ceramic bodies and bodies made of steel or aluminium. Further designs incorporate a spindle or threaded spindle. Body and vitrified bond are different tool features; their combination is adapted to the application.



Grinding tools and bearing rings



Catalogue example: bore grinding

Feature	German catalogue value
Wheel peripheral speed	30-80 m/s
Workpiece stock allowance	Ø 0.1-1.0 mm, diametrical
Dressing stock removal	3-30 µm total
Dressing tool	Rotary dressing tool
Grinding fluid	Oil or emulsion

Source: German EHWA grinding catalogue, page 28. These values describe the example shown there. The original English bearing catalogue gives partly different stock allowance and dressing values. For your process, the appropriate data is matched to the tool and machine; the permissible speed is determined by the marking on the specific grinding wheel.

For tool design: drawing identifying the machining surface, material and hardness, allowance, quality requirements, and details of the machine, mounting and existing tool.

Raceway superfinishing

CBN honing stones are used for superfinishing bearing raceways. In superfinishing, also known as short-stroke honing, a short oscillating tool movement is superimposed on the rotation of the workpiece. The EHWA example shows the raceway of a tapered roller bearing inner ring.

Surface quality and tool life

EHWA describes high surface quality, consistent machining performance and longer tool life than conventional honing stones. These properties can support fewer tool changes, shorter machining times and higher productivity.

Assessment considers surface quality, allowance, machining time and the number of parts machined together. The stone is adapted to the raceway geometry, process and required surface finish.

Catalogue example: tapered roller bearing inner ring

Feature	EHWA catalogue value
Honing stone specification	B2400 K120 VHWP
Workpiece speed	100-200 rpm
Stock allowance	5 µm
Reported result	Ra 0.06 µm or lower

Source: German EHWA grinding catalogue, page 29. The values belong to this application example. The specification is reproduced as the complete EHWA code.



CBN honing stone on the raceway

Tool-life comparison from the catalogue

Tools compared in the catalogue	Number of parts shown
Conventional honing stone	1,500
EHWA CBN honing stone	15,000

These figures show the catalogue comparison; its conditions are not fully stated. They therefore refer to this example and provide no general tenfold tool-life or roughness guarantee.

For assessment: raceway drawing, machine and process, existing and required surface finish, allowance and current stone specification. These details connect the required quality with a suitable tool solution.

Grinding wheel dressing



Profile dressing roll - diamond layer



Metal-bonded cup dresser

Profile dressing rolls: contours to drawing

Profile dressing rolls transfer the required contour to the grinding wheel. EHWA shows applications for ball, roller, hub and water pump bearings. Profiles are manufactured to customer requirements.

The catalogue describes durable dressing diamonds, free-cutting dressing with low spindle loading, and long service life as benefits. The manufacturing process enables tight profile tolerances. A suitable roll can therefore support repeatable contour transfer and reduced non-cutting time.

The dressing roll machines the grinding tool. The bearing component then receives its contour during grinding. Component profile, grinding wheel and dressing unit are therefore considered as one design task.

Metal-bonded cup dressers

Cup dressers are used to dress grinding wheels for internal grinding of bearing rings. EHWA shows them with vitrified-bond CBN grinding wheels. Diamond layer width is an important design parameter: the catalogue illustrates its influence on dressing performance and component dimensional accuracy.

EHWA describes precise dressing, long service life and the possibility of longer dressing intervals with a free-cutting wheel surface.

Catalogue figure: 20,000-30,000 dressing operations, depending on grinding wheel size. This range describes an application example; actual process variables and tool dimensions are coordinated individually.

For your tool solution: profile drawing and tolerances, grinding wheel specification and dimensions, mounting details and data on the existing dressing process.

End-face machining



Double-disc grinding wheel



Tapered roller end-face grinding tools

Face and double-disc grinding

EHWA describes grinding wheels for face and double-disc grinding of inner and outer rings, and rolling elements from roller and needle bearings. Applications include vertical and horizontal machining.

The focus is on end faces and their dimensional, form and surface requirements. Double-disc grinding includes both opposing sides in the operation. Tool design, workpiece guidance and feed are coordinated with the component and machine configuration.

The process objectives described in the catalogue are shorter cycle times, longer tool life and improved surfaces. For your production, these objectives are assessed using cycle time, achieved quality and number of parts machined.

Tapered roller end faces

EHWA shows grinding tools for tapered roller end-face machining using the horseshoe process. Tool design follows the end-face geometry and workpiece guidance in the process.

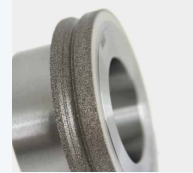
EHWA describes long tool life, high potential stock removal and high-quality surfaces. This can reduce tool purchasing and setup requirements. Dimensional accuracy, form and surface finish are considered together because the required end face results from the interaction of tool and machine.

Basis for assessment: component drawing, material, allowance, required tolerances, machine and existing tool. For tapered rollers, the specific end-face geometry is essential.

Related mechanical engineering applications



Dressing roll for linear guides



Dressing roll for ball screws

Linear guide systems

Linear guide rails and carriages require precise contours with tight tolerances. EHWA shows dressing rolls that transfer these contours to the grinding wheel. Drawing-based profile design connects the required guide geometry with the grinding tool.

Ball screws

A ball screw converts rotary motion into linear motion. EHWA shows dressing rolls for the corresponding grinding operations on the screw and nut. The profile roll transfers the contour required for the ball raceway to the grinding wheel.

The catalogue describes high-concentration dressing rolls with long service life and consistent quality. Tool design depends on the screw or nut profile and the grinding and dressing process used.

Your information helps tool design

Area	Useful information
Component	Bearing type, component, machining surface and drawing
Material	Designation, hardness and heat treatment condition
Machine	Manufacturer, model, process and tool mounting
Existing process	Allowance, surface, tool and process data
Machining objective	Dimensions, form tolerances, surface parameters and intended improvement

Start with the information you already have. Open points can be clarified in the technical discussion. These details help move from a general application to a concrete tool solution.

Talk to us about your process

Do you want to replace a tool, improve your surface finish or develop an existing manufacturing process? We discuss the machining task and suitable tool design with you.

A drawing, machine details and the intended result are a good starting point. For existing processes, the current tool specification and available process data help. Please mention "Bearing machining" and the relevant process so the advice connects directly with the information in this brochure.

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