

Flexible Machining – Extreme Precision



BearingStar
Innovation in High-Precision Machining



WHY MICROFINISH ON GROUND OR HARD TURNED RACEWAYS ?

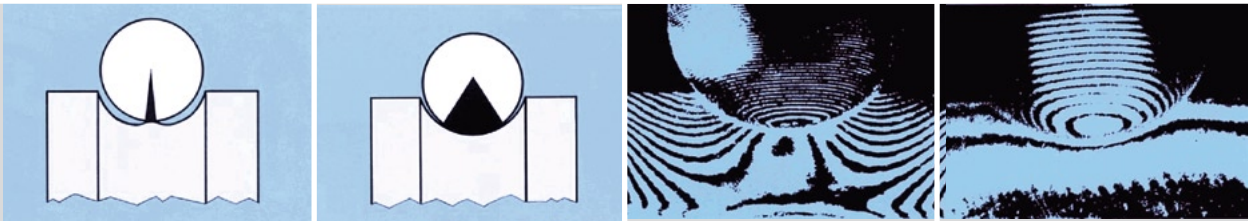
In all industrialized countries antifriction bearings are the most used components with mechanical engineering. The safe and economical functioning of engines, machines, and countless power units depends on their good operation.

No wonder antifriction bearing manufacturers all over the world keep increasing their specifications like optimum roundness of raceways, exact cross section, and the appropriate surface roughness.

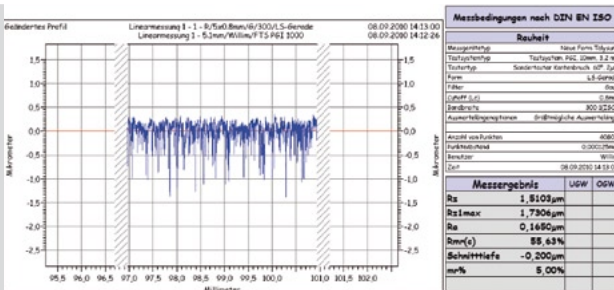
The MICROFINISH process meets the tightest specifications. Thielenhaus' extensive experience, gathered over

more than six decades, has been incorporated in our complete line of globally established MICROFINISH machines for all types of ball bearings and roller bearings as well as the respective rolling elements.

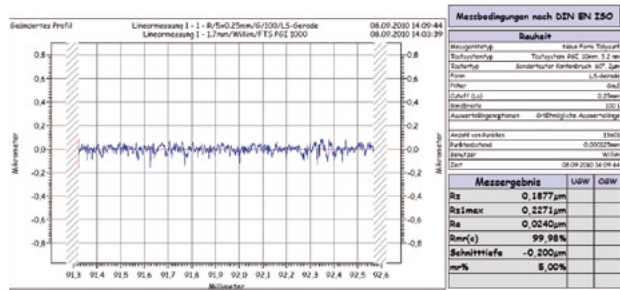
After MICROFINISH antifriction bearings feature an increased load bearing capacity and a longer life span, as well as reduced running noise. Due to the increased load bearing capacity the dimensions can now be reduced.



The photoelastic pictures prove the graphs: MICROFINISH will improve the load bearing capacity.

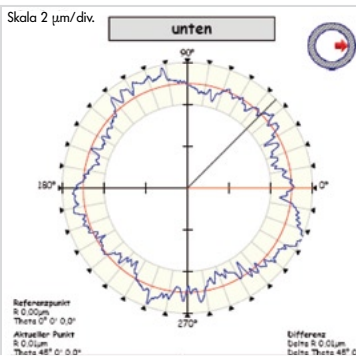


Before MICROFINISH



After MICROFINISH

MICROFINISH improves Roughness Ra and material load bearing capacity Rmr(ε) in %



MICROFINISH improves roundness RONt

HIGHLIGHTS

Based on the extensive experience of the former KM- and RM-machines Thielenhaus has developed a new generation of MICROFINISH machines for the antifriction bearing industry. We name this machine type BearingStar.

- ▶ **Increase in efficiency and precision** through innovative high-performance MICROFINISH
- ▶ **High flexibility** through several tool oscillation units in one machine, e.g. for ball or roller bearing ring raceways
- ▶ **Universal machine platforms** for all types of bearing rings
- ▶ **Short change-over time** through change-over guidance and workpiece visualisation on operating monitor
- ▶ **Interactive Online-Direct-Service** via Internet

NEW MACHINE GENERATION

for flexible and highly efficient MICROFINISH of raceways

OUTER DIAMETER RANGE OF RINGS

BearingStar mini	5 – 19 mm
BearingStar 50	17 – 42 mm
BearingStar 100	32 – 90 mm
BearingStar 200	85 – 200 mm
BearingStar 200 XL	180 – 320 mm
BearingStar 300	150 – 600 mm
BearingStar 400	400 – 1,600 mm

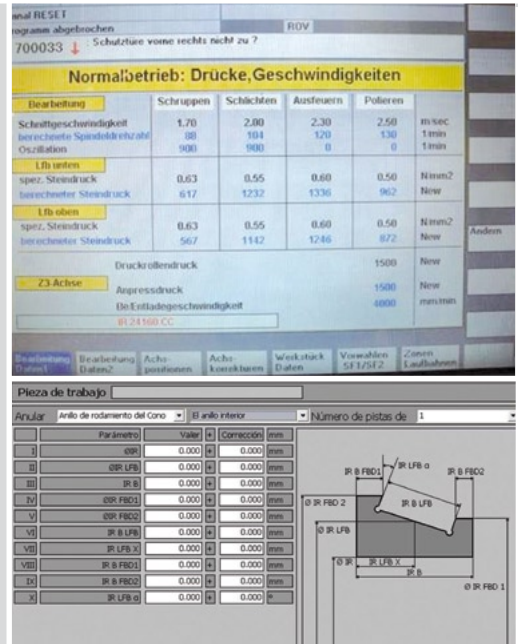
OUTER DIAMETER RANGE OF ROLLERS

BearingStar SF125	3.8 – 80 mm
BearingStar PC24	30 – 140 mm

OPERATOR SUPPORT ON SCREEN

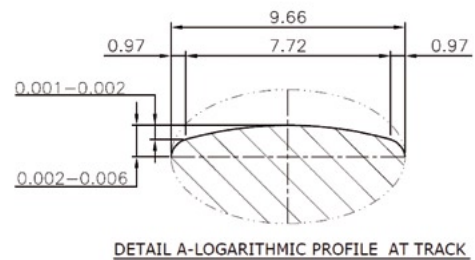
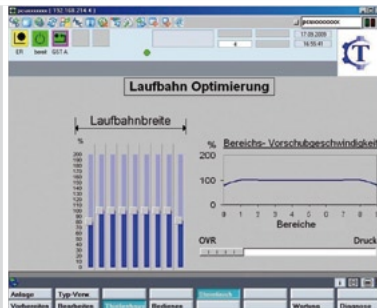
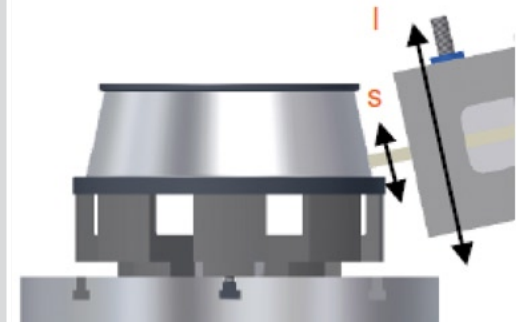
WORKPIECE VISUALISATION AND AUTOMATIC NC-PROGRAM GENERATION (OPTIONAL)

Workpiece dimensions can be entered into a template, depicting the workpiece with its main dimensions as well as the machining process in a table of forces, speeds, etc.



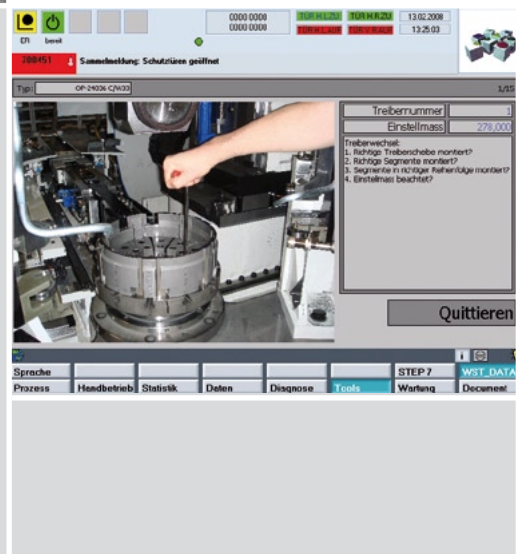
RACEWAY PROFILE OPTIMIZATION (OPTIONAL)

Logarithmic or convex raceway profiles can be preserved or even improved at their ends by overlapping-stroke-MICRO-FINISH with a small stone at variable speed.



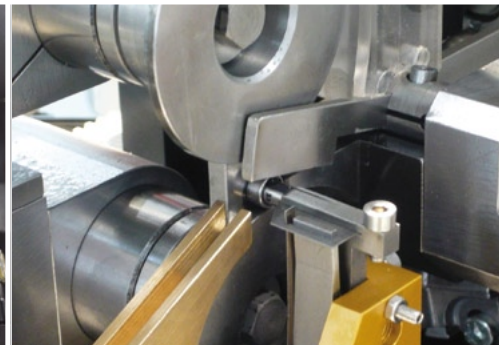
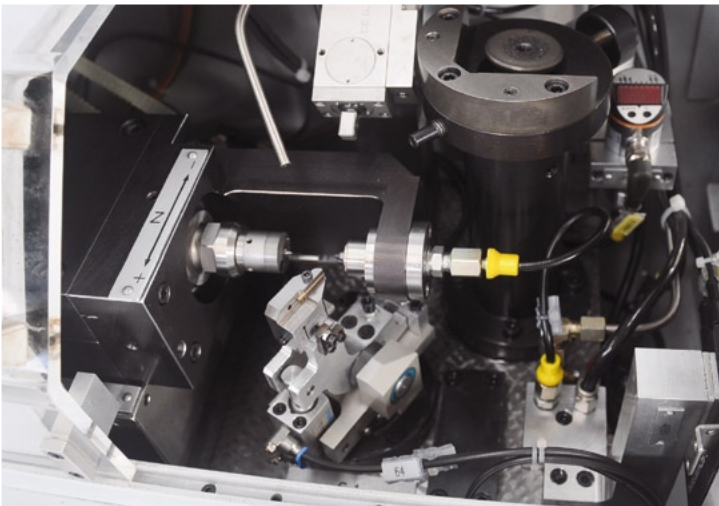
MENU-GUIDED CHANGE-OVER PROCEDURE (OPTIONAL)

Templates depicting the single stages of the change-over procedure are used for a better visualisation of the task. The operator follows the instructions on the screen and confirms the finished job. After confirmation the next template will be shown on the screen and the procedure will repeat itself until all necessary steps have been carried out. Only then the machining program can be started.



BEARINGSTAR MINI

Fully automatic MICROFINISH-machine for machining of raceways on miniature ball and roller bearing inner or outer rings according to 1-step-method



TECHNICAL DATA

Working stations	1
Workpiece diameters (mm)	5 - 19
Workpiece width (mm)	2.5 - 15
Workpiece speed (rpm)	0 - 36,000
Oscillation frequency (double stroke/min)	0 - 1,200
Radial oscillation angle (+/-)	0 - 15°
Linear oscillation stroke (mm)	0 - 2
Stone pressure (N)	0 - 10

RING TYPES

- ▷ Deep groove ball bearing (DGBB)
- ▷ Angular contact ball bearings (ACBB)
- ▷ Cylindrical roller bearings (CRB)
- ▷ Special shaft bearings

MACHINING SOLUTIONS

- ▷ 1-step machining with 1-stone type
- ▷ Rough and fine machining by variation of cutting speed, stone pressure and oscillation

BEARINGSTAR 50

Fully automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

RING TYPES

- ▷ 1- or 2-row radial-ball bearings
- ▷ Axial ball bearings
- ▷ 1- or 2-row contact angular ball bearings
- ▷ Cylindrical roller bearings
- ▷ Taper roller bearings

MACHINING SOLUTIONS

- ▷ 1-step machining on 1-station machine
- ▷ **1- or 2-step-machining selectable on 2-station machine**
- ▷ Outer or inner rings in 1 machine
- ▷ Rough and fine machining by variation of cutting speed, stone pressure and oscillation

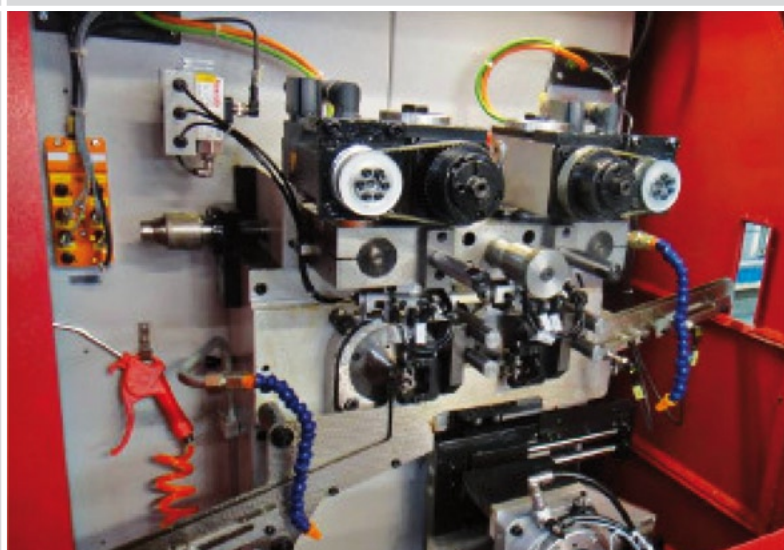
TECHNICAL DATA

Outer diameter of outer ring (mm)	17 – 42
Inner diameter of inner ring (mm)	8 – 20
Ring width (mm)	5 – 12
Workspindle speed (rpm)	0 – 12,000
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 18°
Linear oscillation stroke (mm)	0 – 6
Stone pressure at 4.5 bar (N)	0 – 140
No. of machining stations	1 or 2



1-station machine BS 50

2-station machine BS 50



BEARINGSTAR 100

Fully automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

RING TYPES

- ▷ 1- or 2-row radial ball bearings
- ▷ Axial ball bearings
- ▷ 1- or 2-row contact angular ball bearings
- ▷ Cylindrical roller bearings
- ▷ Taper roller bearings

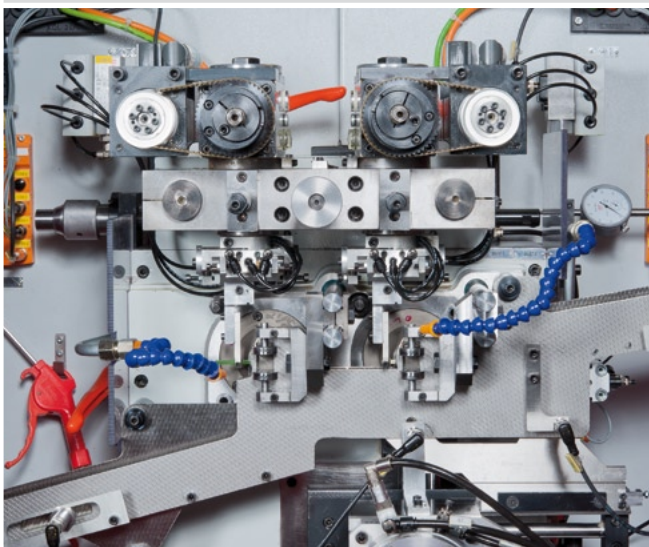


TECHNICAL DATA

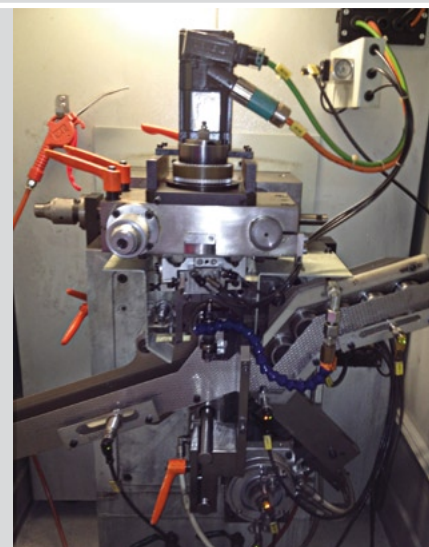
Outer diameter of outer ring (mm)	32 – 90
Inner diameter of inner ring (mm)	15 – 55
Ring width (mm)	8 – 30
Workspindle speed (rpm)	0 – 9,000
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 18°
Linear oscillation stroke (mm)	0 – 6
Stone pressure at 4.5 bar (N)	0 – 140
No. of machining stations	1 or 2

MACHINING SOLUTIONS

- ▷ 1-step machining on 1-station machine BearingStar 111
- ▷ 1- or 2-step-machining selectable on 2-station machine BearingStar 122
- ▷ Outer- or inner rings in 1 machine
- ▷ Outer raceway and flange for taper roller inner rings in 2-station machine BearingStar 122
- ▷ Rough and fine machining by variation of stone pressure and oscillation



1-station machine BS 122



2-station machine BS 122

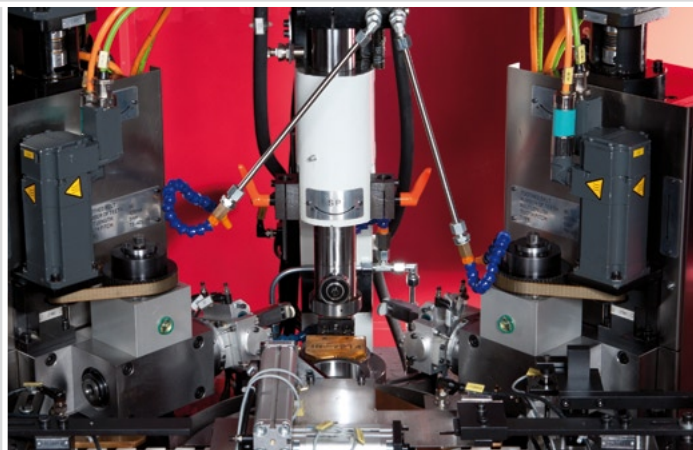


BEARINGSTAR 200

Fully automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

TECHNICAL DATA

Outer diameter of outer ring (mm)	85 – 200
Inner diameter of inner ring (mm)	50 – 180
Ring width (mm)	15 – 80
Workspindle speed (rpm)	0 – 3,000
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 18°
Linear oscillation stroke (mm)	0 – 6
Stone pressure at 4.5 bar (N)	80 – 360
No. of machining stations	1 or 2



BEARINGSTAR 200 XL

Fully automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

RING TYPES

- ▷ 1- or 2-row radial ball bearings
- ▷ Axial ball bearings
- ▷ 1- or 2-row contact angular ball bearings
- ▷ Cylindrical roller bearings
- ▷ Taper roller bearings
- ▷ Spherical roller bearings

MACHINING SOLUTIONS

- ▷ 1-step machining on 1-station machine BearingStar 211
- ▷ 1- or 2-step machining selectable on 1-station machine BearingStar 212
- ▷ Outer or inner rings in 1 machine
- ▷ Outer raceway and flange for taper roller inner rings in 1-station machine BearingStar 212
- ▷ Outer diameter polishing with tape unit
- ▷ Rough and fine machining by variation of cutting speed, stone pressure and oscillation



TECHNICAL DATA

Outer diameter of outer ring (mm)	180 – 320
Inner diameter of inner ring (mm)	100 – 270
Ring width (mm)	60 – 200
Workspindle speed (rpm)	0 – 3,000
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 18°
Linear oscillation stroke (mm)	0 – 6
Stone pressure at 4.5 bar (N) BG1	80 – 360
Stone pressure at 4.5 bar (N) BG2	35 – 140
Stone pressure at 4.5 bar (N) BG3	50 – 220
No. of machining stations	1



BEARINGSTAR 300

Fully or semi-automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

RING TYPES

- ▷ 1- or 2-row radial ball bearings
- ▷ Axial ball bearings
- ▷ 1- or 2-row contact angular ball bearings
- ▷ Cylindrical roller bearings
- ▷ Taper roller bearings
- ▷ Spherical roller bearings

MACHINING SOLUTIONS

- ▷ 1-or 2-step machining
- ▷ Outer or inner rings
- ▷ Rough and fine machining by variation of cutting speed, stone pressure and oscillation
- ▷ Flange MICROFINISH
- ▷ Outer diameter polishing

TECHNICAL DATA

Outer diameter of outer ring (mm)	150 – 600
Inner diameter of inner ring (mm)	100 – 500
Ring width (mm)	20 – 300
Workspindle speed (rpm)	0 – 500 / 1,000
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 16°
Linear oscillation stroke (mm)	±3
Stone pressure at 4.5 bar (N)	
for radial oscillation unit	0 – 220
Stone pressure (N)	
for linear oscillation unit	100 – 1,000
No. of machining stations	1

MACHINING UNITS



Radial oscillation unit with AC servomotor direct drive for ball bearings



Linear oscillation unit with linearmotor direct-drive for roller bearings



Cup wheel unit for spherical bearing outer rings



Tape unit for polishing of outer rings



Tape unit for machining of boards

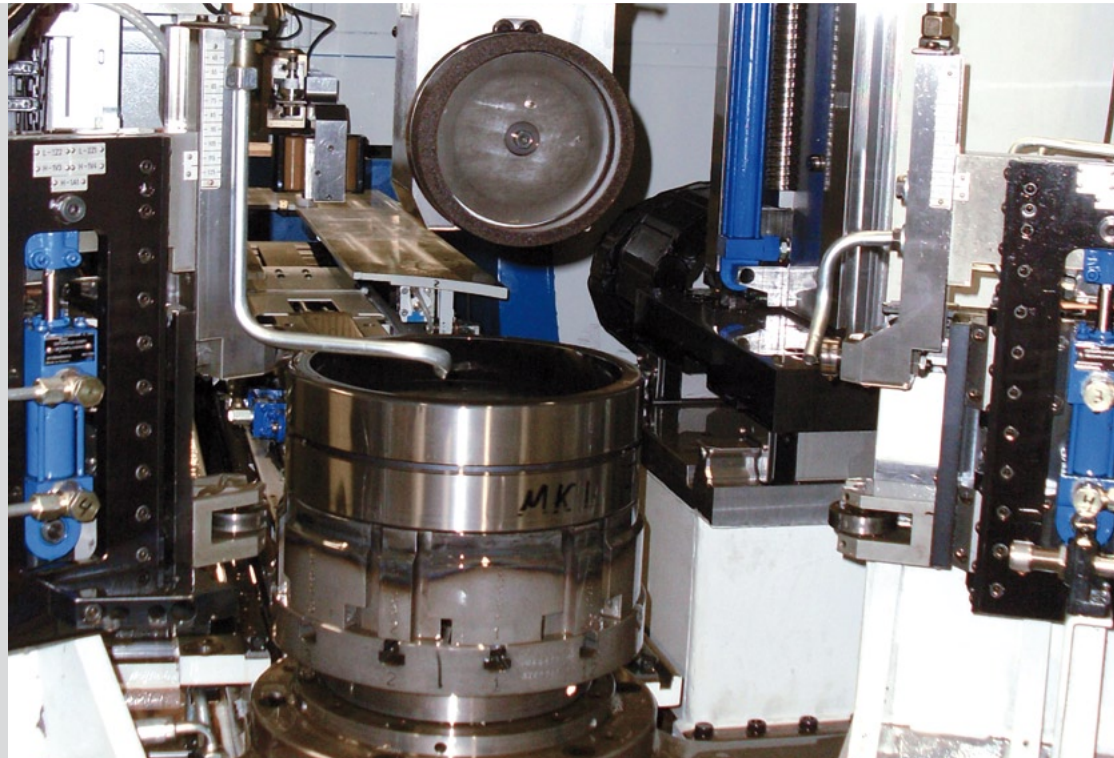


Radial oscillation unit with AC servomotor for spherical roller inner rings

Radial oscillation unit for spherical roller inner rings



MicroSens-forced controlled cup wheel machining of spherical roller outer rings





BEARINGSTAR 400

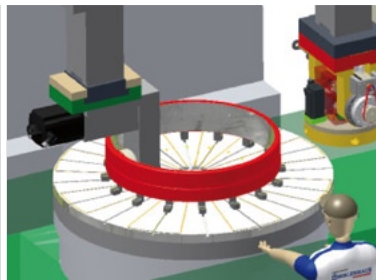
Semi-automatic MICROFINISH-machine for machining of raceways on ball and roller bearing inner or outer rings according to 1- or 2-step-method

RING TYPES

- ▷ 1- or 2-row radial ball bearings
- ▷ Axial ball bearings
- ▷ 1- or 2-row contact angular ball bearings
- ▷ Cylindrical roller bearings
- ▷ Taper roller bearings
- ▷ Spherical roller bearings

TECHNICAL DATA

Outer diameter of outer ring (mm)	400 – 1,600
Inner diameter of inner ring (mm)	300 – 1,400
Ring width (mm)	40 – 500
Workspindle speed (rpm)	0 – 300
Oscillation frequency (double stroke/min)	0 – 1,200
Oscillation angle (+/-)	0 – 6°
Linear oscillation stroke (mm)	±3
Stone pressure (N)	100 – 1,000
No. of machining stations	1



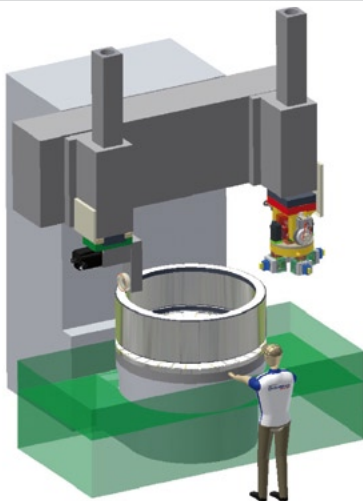
CUP WHEEL MICROFINISH

on spherical roller bearing – outer ring raceway



STONE MICROFINISH

on spherical roller bearing – inner ring raceway

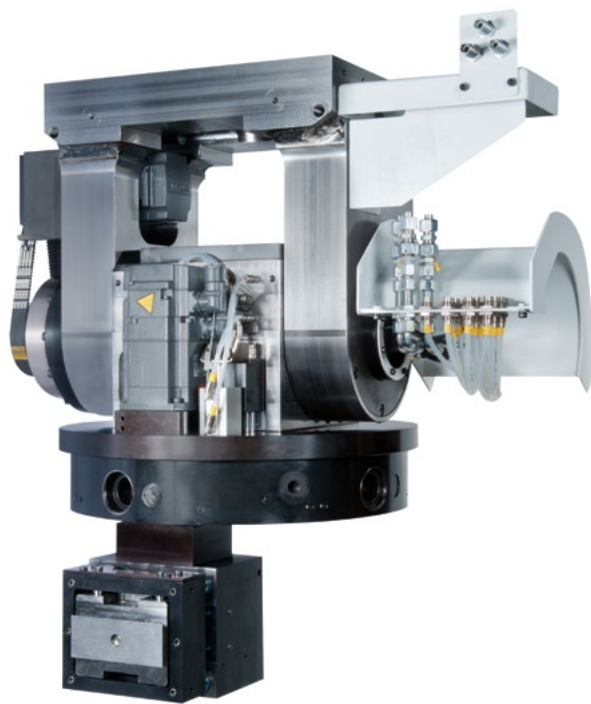


TAPE MICROFINISH

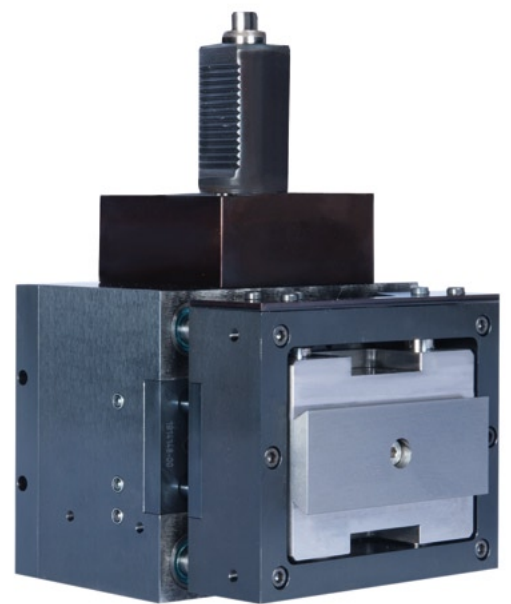
on taper roller bearing – outer ring raceway

MACHINING SOLUTIONS

- ▷ 1- or 2-step-machining
- ▷ Forced controlled cup wheel machining for SRB outer rings
- ▷ Outer or inner rings
- ▷ Outer diameter polishing with tape unit
- ▷ Rough and fine machining by variation of cutting speed, stone pressure and oscillation
- ▷ Tape MICROFINISH of roller bearing outer and inner rings



MICROFINISH turret



Driven oscillation unit



BEARINGSTAR SF125

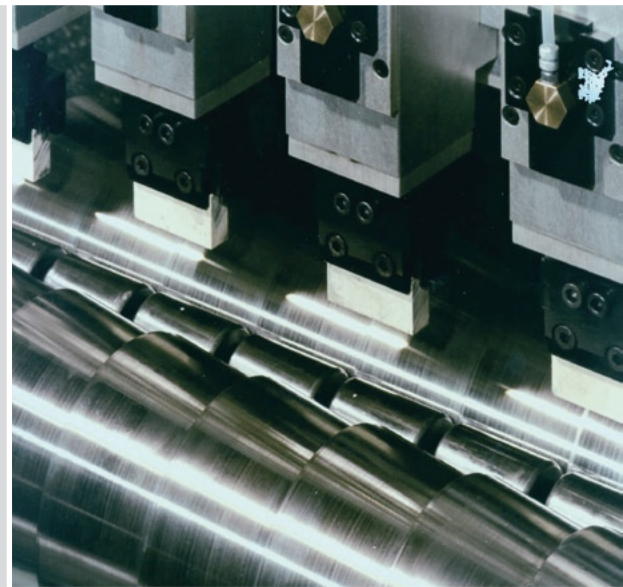
Automatic MICROFINISH-machine for machining small and medium rollers of mass production

ROLLER TYPES

- ▷ Cylindrical rollers
- ▷ Taper rollers
- ▷ Needle rollers

TECHNICAL DATA

Working diameter (mm)	3.8 – 80
Drive roll speed (rpm)	0 – 720
Drive roll length (mm)	1,090
Number of tool carriers	8
Tool oscillation frequency (double str./min)	75 – 1,500
Horizontal oscillation stroke of the tool (mm)	0 – 6
Vertical oscillation stroke of the tool (mm)	50
Total power required (kW)	9
Minimum compressed air pressure (bar)	4.5
Flushing oil system - flow rate (l/min)	80



MACHINING SOLUTIONS

- ▷ Cylindrical profile
- ▷ Crown profile
- ▷ **Logarithmic profile**



BEARINGSTAR PC24

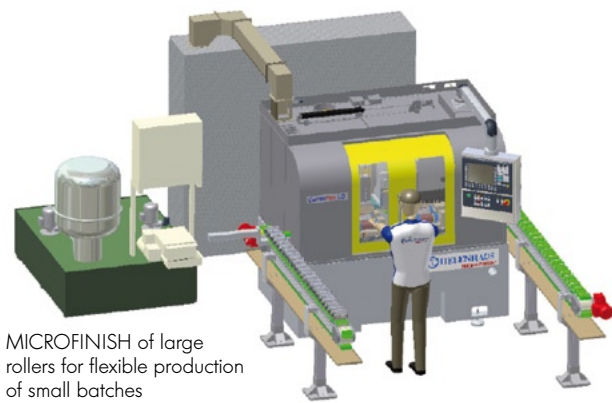
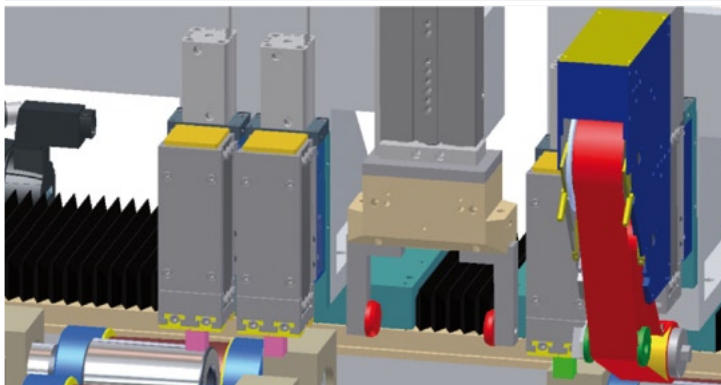
Automatic MICROFINISH-machine for medium or large rollers of small batches

TECHNICAL DATA

Working diameter (mm)	30 – 140
Working length (mm)	30 – 200
Number of working stations	1 – 2
Stone unit	
Oscillation stroke (mm)	±1/±2/±3
Oscillation frequency (double strokes/min)	0 – 1,600
Tool contact pressure (N)	20 – 160
Tape unit	
Number of tape units	1(0)
Oscillation stroke (mm)	±1/±2/±3
Oscillation frequency (double strokes/min)	0 – 1,600
Tool contact pressure (N)	20 – 160
Flushing oil system - flow rate (l/min)	80

ROLLER TYPES

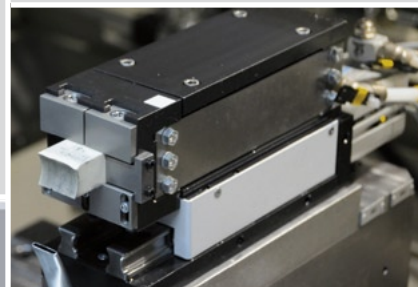
- ▷ Cylindrical rollers
- ▷ Taper rollers
- ▷ Spherical tapered rollers
- ▷ Ton rollers



MICROFINISH of large rollers for flexible production of small batches

MACHINING SOLUTIONS

- ▷ Cylindrical profile
- ▷ Crown profile
- ▷ **Logarithmic profile**



Stone unit



Tape unit

Further High Precision Machining Solutions for



All kinds of shafts



Flat and spherical surfaces



Double disc grinding



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Thielenhaus Technologies GmbH

Schwesterstraße 50
42285 Wuppertal, Germany
Phone: +49 (0)2 02-4 81-0
Fax: +49 (0)2 02-45 04 45
info@thielenhaus.com
www.thielenhaus.com



Thielenhaus Microfinish Corporation

42925 W. Nine Mile Road
Novi, MI 48375, U.S.A.
Phone: +1 (2 48) 3 49-94 50
Fax: +1 (2 48) 3 49-94 57
info@thielenhaus.com
www.thielenhaus.com



Thielenhaus Machinery (Shanghai) Co., Ltd
Jiangtian Dong Lu 212, building 7
Songjiang Industrial Zone
201613 Shanghai, P.R. China
Phone: +86 (21) 67 75 31 57
Fax: +86 (21) 33 52 87 66
info@thielenhaus.cn
www.thielenhaus.cn



Superfinish Innovation AG

St. Gallerstraße 52
CH-9548 Matzingen
Phone: +41 (0) 5 23 76 26 20
Fax: +41 (0) 5 23 76 26 19
si-ag@bluewin.ch
www.superfinish.ch