

## **Mechanical Multiple Roller Tools**

*ECOROLL's multiple roller tools are specially designed to machine cylindrical bores (both through and blind holes), stepped bores and the inner and outer surfaces of cylinders and similar non-cylindrical surfaces.*

*This group of tools includes types G, R, RD, RAD, RA, RP, RDP, RK and RKA.*



Type G roller burnishing tool on a CNC-controlled lathe.



*These versatile tools feature both convenient diameter adjustment and reliable, high-precision performance.*

Type G roller burnishing tool with internal coolant.

*The tools can be applied with CNC-controlled lathes, drills, milling machines and machining centers as well as with manually controlled machines.*



Machining a connecting rod with a Type G tool.



Machining a three-section stepped bore with a Type RD tool.

*In addition, the tools require minimal lubrication and the wear parts are easy to change. This uncomplicated maintenance together with the short work cycle add up to considerable time-savings.*



Machining a universal joint shaft with a Type RA tool.

# Type G Tool Application: Cylindrical bores

Through holes, diameters 4 – 200 mm  
Blind holes, diameters 6 – 200 mm

## Features

- For bore tolerance up to class IT8
- Type GE for bore tolerance up to class IT11 for  $\varnothing 50$  mm and larger
- Suitable for metals with tensile strength up to 1400 N/mm<sup>2</sup> and maximum hardness HRC  $\leq 45$
- Achieves a surface quality of  $R_z < 1 \mu\text{m}$  ( $R_a = 0.2 \mu\text{m}$ )
- For use on CNC-controlled lathes, drills, mills, and machining centers as well as manual machines
- Right hand rotation

## Basic tool design

- Type G tools consist of a tool body and roller head.
- Tool body includes shank and roller burnishing diameter adjustment assembly with an adjustment increment of 1 micron.
- Tool shanks are Morse taper or cylindrical Weldon design. Specialized shanks also available.
- Roller head consists of cone, cage and rollers.
- Roller heads interchangeable within tool body diameter range. Optional self-feeding cages also available.



## Parameters

- Circumferential speed: up to 250 m/min.
- Feed rate: 0.05 - 0.3 mm/rev./roller
- Rolling length: for bore holes with diameters of 36 mm or greater, the tool's convenient dimensions allow for unlimited rolling length. For diameters of less than 36 mm, tools with standard rolling length are available. Specially designed versions available by request.

Tool body	Diameter range D (all measurements in mm)	Tool shank: Morse taper or cylindrical shank $\varnothing e \times f$	a	b	c <sup>1)</sup>	d max.	i	l	Rolling length
G1.1	$\geq 4 < 17$	MK2 $\varnothing 20h6 \times 50$	35	52	1.5	70	80	Rolling length + 8 mm	Standard rolling length: 50 mm
	$\geq 17 < 21$				2				
G1.2	$\geq 21 < 33$	MK2 $\varnothing 20h6 \times 50$ $\varnothing 25h6 \times 56$	49	68	3	74	80	89	Standard rolling length: 50 mm
G1.3	$\geq 33 < 36$ $\geq 36 < 50$						99		
G2	$\geq 50 < 100$	MK3 $\varnothing 25h6 \times 56$	71	84	5	110	124	79	Unlimited rolling length
G3	$\geq 100 < 201^2)$	MK4 $\varnothing 32h6 \times 60$	71	84	5	110	124	100	Unlimited rolling length

**NOTE: 1)** All measurements in mm. Measurement c does not apply for blind hole tools.

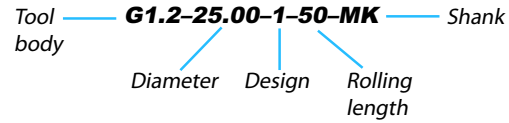
**2)** For workpieces with diameters larger than 201 mm, please see ECOROLL Type R tools.



### Advantages

- Reliable, high precision performance
- Short cycle time
- Convenient diameter adjustment
- Minimal lubrication required (oil or emulsion)
- Tool automatically collapses when retracted to prevent surface damage
- Easy to change wear parts

### How to order:



1. Specify the tool body type and machining diameter (see following table).
 

**NOTE:** Depending on the application, blind hole tools may allow a larger range of settings than shown in the table.
2. Specify the design version:
  - 1: through holes with non-feeding cage
  - 2: through holes with self-feeding cage
  - 3: blind holes with non-feeding cage
3. Specify the rolling length in mm: 100, 150, 200, 250, 300 (other lengths by request).
4. Specify the shank type:
  - MK: Morse taper
  - ZS: Cylindrical Weldon shank

Tool body	Diameter D	Setting range through hole blind hole <sup>3)</sup>	Number of rollers <sup>4)</sup>	Roller diameter Ø g x h	Roller radius r	Rolling length
	mm			mm		
G1.1 ≥ 4 < 21	4	- 0.05 / + 0.2	3	1 x 4	0.5	50
	5	no blind hole		1.5 x 6	1	
	6-7	- 0.05 / + 0.3	4	2 x 6	1.5	
	8-9	- 0.05 / + 0.1		2 x 10 <sup>3)</sup>		
	10	- 0.05 / + 0.4	5	3 x 9		
	11-16	- 0.05 / + 0.1		5 x 16		
	17-20	- 0.05 / + 0.6				
G1.2 ≥ 21 < 33	21-24	- 0.05 / + 0.1	6			75
	25,26,28,30,32					
G1.3 ≥ 33 < 50	33-35	- 0.05 / + 0.8	8			unlimited
	36	- 0.05 / + 0.1				
	38			8 x 25	2.5	
	40,42,44-48					
G2 ≥ 50 < 100	50,52,55,58, 60,62,63,65,68, 70,72,75,78,80,85		12			
	90,95					
G3 ≥ 100 < 201	100,110,115,120,125 130,140,150,160		16	14 x 35	4	
	170,180,190,200					

**NOTE: 3)** Depending on the application, blind hole tools may allow a larger range of settings than shown in the table.

**4)** Please exchange only complete sets of rollers. When ordering rollers, specify through or blind hole.

# Type R Tool Application: Cylindrical bores

Through holes, diameters 201 – 450 mm  
Blind holes, diameters 201 – 450 mm

## Features

- For bore tolerance up to class IT8
- Suitable for metals with tensile strength up to 1400 N/mm<sup>2</sup> and maximum hardness HRC ≤ 45
- Tools achieve a surface quality of  $R_z < 1 \mu\text{m}$  ( $R_a = 0.2 \mu\text{m}$ )
- For use on CNC-controlled lathes, drills, mills, and machining centers as well as manual machines
- Right hand rotation

## Advantages

- Short cycle time
- Convenient diameter adjustment
- Minimal lubrication required (oil or emulsion)
- Tool automatically collapses when retracted to prevent surface damage
- Easy to change wear parts

## Basic tool design

- Type R tools consist of a tool body and roller head.
- Tool body includes shank and diameter adjustment assembly.
- Adjustment assembly accommodates any size within the setting range.
- Specially designed rollers for bores with wide ring grooves or with cross holes. These rollers guarantee smooth tool operation and retraction.

## Parameters

- Circumferential speed: up to 250 m/min.
- Feed rate: 0.10 - 0.4 mm/rev./roller

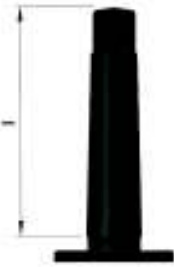


Tool body	Diameter range D	Setting range through blind hole <sup>1)</sup>	Tool shank: Morse taper or cylindrical shank Ø e x f	Number of rollers <sup>2)</sup>	Roller diameter Ø g x h	Roller radius r	a	b	c	d	i	l
							mm					
R5	≥ 201 < 255	-0.05 / +0.8	MK5 Ø 50 h6 x 80	16	14 x 35	4	90	100	5	125	156	134
	≥ 255 < 320	-0.05 / +0.1		20								
	≥ 320 < 450			28								

**NOTE: 1)** Depending on the application, blind hole tools may allow a larger range of settings than shown in the table.

**2)** Please exchange only complete sets of rollers. When ordering rollers, specify through or blind hole.

# Type RD and RAD Tool Applications: Stepped bores and stepped shafts



## Features

- For bore tolerance up to class IT8
- Suitable for metals with tensile strength up to 1400 N/mm<sup>2</sup> and maximum hardness HRC ≤ 45
- Tools achieve a surface quality of  $R_z < 1 \mu\text{m}$  ( $R_a = 0.2 \mu\text{m}$ )
- For use on CNC-controlled lathes, drills, mills, and machining centers as well as manual machines
- Right hand rotation

## Advantages

- Short cycle time
- Eliminates the need for a second tool
- Convenient diameter adjustment
- Minimal lubrication required (oil or emulsion)
- Tool automatically collapses when retracted to prevent surface damage
- Easy to change wear parts

## Basic tool design

- Type RD and RAD tools consist of a tool body and roller head.
- Tool body includes shank and two diameter adjustment assemblies for independent adjustment.
- Roller head consists of two external or internal cones, one double cage, and two sets of rollers.
- Standard for Type RD tools are Morse taper shanks; Type RAD has cylindrical shanks.
- Roller head is designed for specific workpiece dimensions.

## Parameters

- Circumferential speed: up to 250 m/min.
- Feed rate: 0.10 - 0.4 mm/rev./roller
- Rolling length: the rolling length  $h$  as well as the step increment  $g$  is designed for specific workpiece dimensions. To avoid using more than one tool to process one workpiece, these tools can be equipped with very small step increments and up to three steps.

Tool body	Diameter range D	Setting range through blind hole	Tool shank: Morse taper or cylindrical shank $\varnothing e \times f$	a	b	c <sup>3)</sup>	d min.	k	i	
	mm	- / + mm	mm	mm						
RD1	$\geq 16 < 50$	$\frac{-0.05/+0.6}{-0.05/+0.1}$	MK3 $\varnothing 25 \text{ h6} \times 60$	53	110	3	12 and/or 0.6 x D	125	99	
RD2	$\geq 50 < 100$	$\frac{-0.05/+0.8}{-0.05/+0.1}$	MK4 $\varnothing 32 \text{ h6} \times 60$	75	150	3	30	168	124	
RD3	$\geq 100 < 201$									
		Setting range (through hole)	Tool shank $\varnothing e \times f$	a1	a2	b min.	c min.	d min.	g min.	h min.
RAD1	$\geq 12 < 25$	-0.1 / +0.4	$\varnothing 25 \text{ h6} \times 56$	96	65	130	30	0.8 x D	depends on the tool	
RAD2	$\geq 25 < 51$	-0.1 / +0.6	$\varnothing 32 \text{ h6} \times 60$	140	105	160				

**NOTE: 3)** No dimension  $c$  on blind hole tools.

# Type RA Tool Application: Cylindrical outer surfaces

Diameters 3 – 160 mm

## Features

- For bore tolerance up to class IT8
- Type RAP with compensating roller head for bore tolerance up to class IT11
- Suitable for metals with tensile strength up to 1400 N/mm<sup>2</sup> and maximum hardness HRC ≤ 45
- Achieves a surface quality of  $R_z < 1 \mu\text{m}$  ( $R_a = 0.2 \mu\text{m}$ )
- For use on CNC-controlled lathes, drills, mills, and machining centers as well as manual machines
- Right hand rotation

## Basic tool design

- Type RA roller burnishing tools consist of a tool body and roller head.
- Tool body includes shank and diameter adjustment assembly.
- Cylindrical shanks standard (Morse taper shanks also available).
- Roller head consists of the external cone, cage, and rollers.
- Roller heads interchangeable within the diameter range for the tool body size.

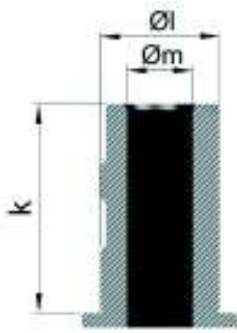
## Parameters

- Circumferential speed: up to 250 m/min.
- Feed rate: 0.05 - 0.3 mm/rev./roller
- Rolling length: when equipped with a standard shank, the tool's rolling length is limited (see the following table). For longer workpieces ECOROLL® can supply roller burnishing tools for unlimited rolling length. These tools are equipped with a hollow, reinforced cylindrical shank.



Tool body	Diameter range D	Tool shank: Morse taper or cylindrical shank Ø e x f		a	b	c <sup>1)</sup>	d	i
		mm						
RA1	≥ 3 < 12	Ø 20 h6 x 50 (MK2)	Ø 25 h6 x 60 x 15	55	45	21	81	80
RA2	≥ 12 < 25	Ø 25 h6 x 56 (MK3)	Ø 40 h6 x 70 x 28	73	65			99
RA3	≥ 25 < 55	Ø 40 h6 x 70 (MK4)	Ø 80 h6 x 90 x 57	114	105	28	108	124
RA4	≥ 55 < 85		Ø 110 h6 x 110 x 88	152	140			156
RA5	≥ 85 < 110	Ø 50 h6 x 80 (MK5)	Ø 150 h6 x 120 x 113	190	180	35	130	
RA6	≥ 110 < 160		Ø 190 h6 x 150 x 150 <sup>1)</sup>	238	225			

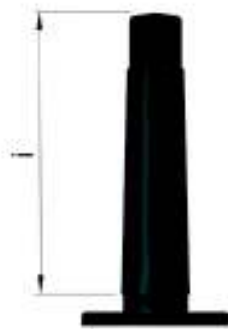
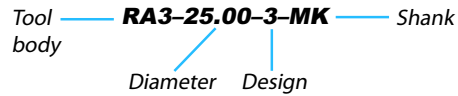
**NOTE: 1)** Maximum diameter for unlimited rolling length is 145 mm.



**Advantages**

- Reliable, high precision performance
- Short cycle time
- Convenient diameter adjustment
- Minimal lubrication required (oil or emulsion)
- Tool automatically collapses when retracted to prevent surface damage
- Easy to change wear parts

**How to order:**



1. Specify the tool body type and machining diameter (see following table).

**NOTE:** Non-standard diameters are available by request.

2. Specify the design version:
  - 3: with non-feeding cage
  - 4: with self-feeding cage
3. Specify the shank type:
  - MK: Morse taper
  - ZS: Cylindrical shank (limited rolling length)
  - ZU: Hollow cylindrical shank (unlimited rolling length)

Tool body	Diameter D	Setting range	Number of Rollers	Roller diameter Ø g x h	Roller radius r	Rolling length	
	mm			- / + mm	mm		
RA1 ≥ 3 < 12	3 and 5	- 0.2 / + 0.05	3	5 x 16 S	1.5	85	
	6-7						- 0.4 / + 0.1
	8-10	5					
RA2 ≥ 12 < 25	12,14-16	- 0.4 / + 0.1	7	8 x 25 S	2.5	110	
	17,18,20,22,24						
RA3 ≥ 25 < 55	25,28,30,32,35	- 0.6 / + 0.1	9				14 x 35 S
RA4 ≥ 55 < 85	40,45,50			11			
RA5 ≥ 85 < 110	85,90,95,100,105			9			
RA6 ≥ 110 ≤ 160	110,115,120,125,130,140,150,160		11				

**NOTE: 2)** Please exchange only complete sets of rollers.



## Type RP, RDP, RK, RKA Tool Applications: Non-cylindrical surfaces

### Features

The RP, RDP, RK and RKA roller burnishing tools achieve outstanding results on non-cylindrical surfaces such as plane faces and internal and external tapered surfaces. These tools work under axial load and can be used with almost any type of machine. Either the tool or the workpiece can rotate.

A flexible disc spring assembly transfers the axially directed rolling force from the machine to the roller head. The resulting uniform rolling force allows these tools to produce a remarkably consistent quality finish. The tools can be used to machine all metals with tensile strength up to 1400 N/mm<sup>2</sup> and maximum hardness of 45 HRC.

### Advantages

- Reliable, high precision performance
- Wide variety of applications
- Extremely short processing time
- Disc spring assembly facilitates consistent, high quality results
- Suitable for use with many different machines
- Standard tool shanks available: Morse taper, cylindrical, and VDI tool shanks
- Easy to change wear parts

### Basic tool design

Type RP, RDP, RK, and RKA roller burnishing tools consist of a tool body and roller head.

Tool bodies for the RP, RDP, RK and RKA tools come in four sizes: S1 to S4.

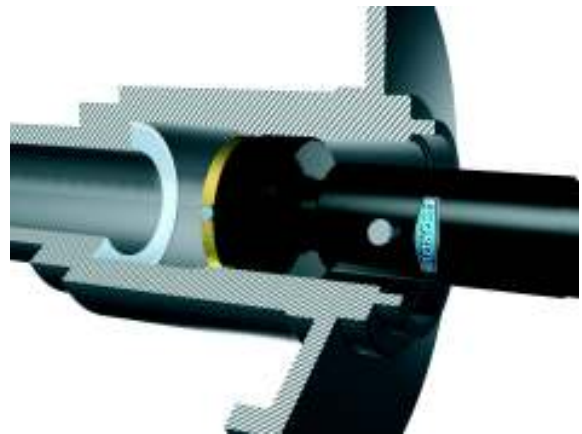
Usually the tools are equipped with Morse taper shanks, but cylindrical shanks, shank DIN 69880 (VDI-shank) and shanks for other clamping systems are also available. In addition, the tool body includes a disc spring assembly specifically designed and arranged for each individual machining task.

Roller heads are produced according to the specific workpiece dimensions. The roller head unit is mounted onto the tool body. The roller head determines the tool's type.

The illustrations on the following page demonstrate both the modular system and the wide variety of combinations available.



Machining a steering lever with a Type RK tool.



Machining a gear housing with a Type RP tool.

# Tool Design and Specifications

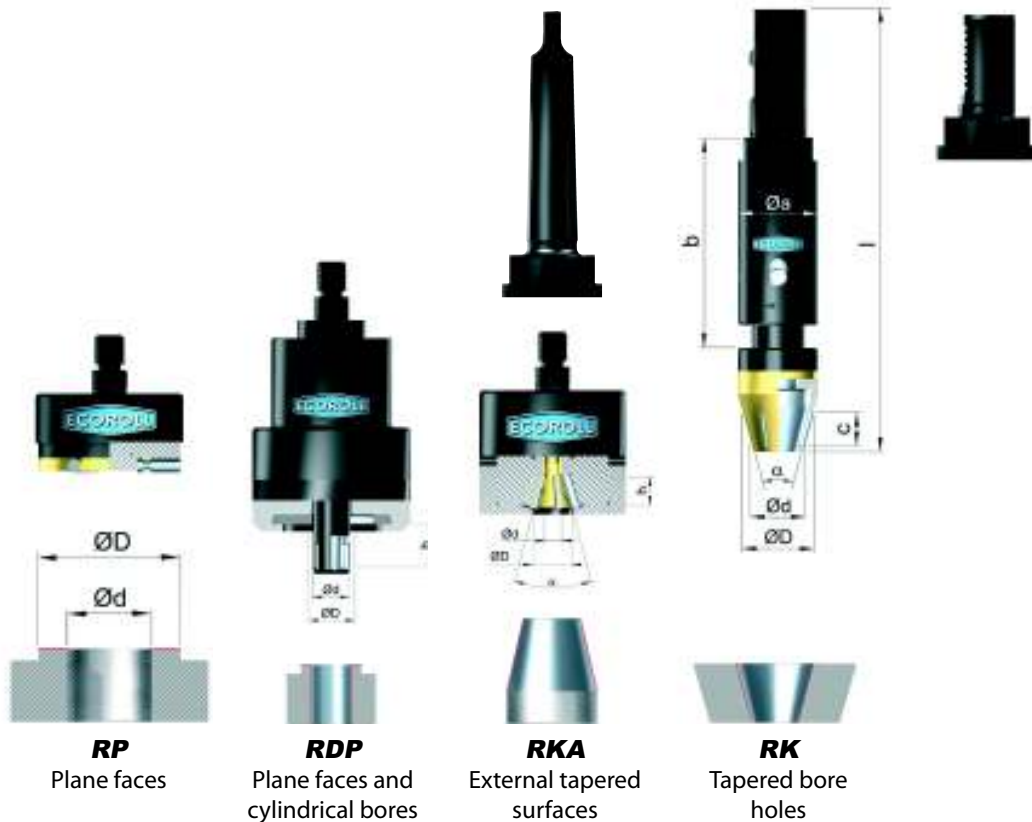
**Available shanks:**

Morse taper  
DIN 228  
MK

Cylindrical shank  
DIN 1835 B, Form B  
ZS

Cylindrical shank  
DIN 69880  
VDI

**Available roller heads:**



**Tool application:**

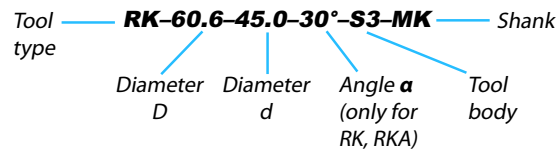
**RP**  
Plane faces

**RDP**  
Plane faces and cylindrical bores

**RKA**  
External tapered surfaces

**RK**  
Tapered bore holes

**How to order:**



The following table lists the standard dimensions for the tool bodies. Roller head dimensions and suitable tool body size depend on the workpiece dimensions and the material yield strength.

To ensure optimal tool design, please provide a drawing of the workpiece, including material specifications. If drawings are not available, provide the dimensions of the desired roller head and the material yield strength of the part to be burnished.

Tool body	a	b	Maximum force	Standard shank
	mm		kN	
<b>S1</b>	26	66	3.9	MK1
<b>S2</b>	35	92	13.5	MK2
<b>S3</b>	45	107	21.6	MK3
<b>S4</b>	65	135	40.5	MK4