



YAMATO[®]
MACHINE & TOOL ORGANIZATION



















ROBUTO

ROLLER BURNISHING TOOLS

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INDEX

Technical Information	2		MIC - Internal Angular Robuto	37	
CPL - Internal Robuto	5		MOC - External Angular Robuto	38	
MOD - External Robuto	20		MFF - Flat Face Robuto	39	
SKUV20- Single Roll Robuto	26		MICRO Robuto	40	
SKUV20-R- Single Roll Radius Robuto	31		CMID - Compensating Robuto	42	
SKUV20 Special Single Roll Tools	32		YDB - Diamond Robuto	43	
SKUV30 Deep Rolling Robuto	36		GRV - Multi Purpose Single Roll Robuto	44	
			BSBT - Boring Bar Style Robuto	45	
			EPCPL - Expander for Valve Seat	46	

ART OF ROLLER BURNISHING

Surface operations by "Cold Working" are applied in order to:

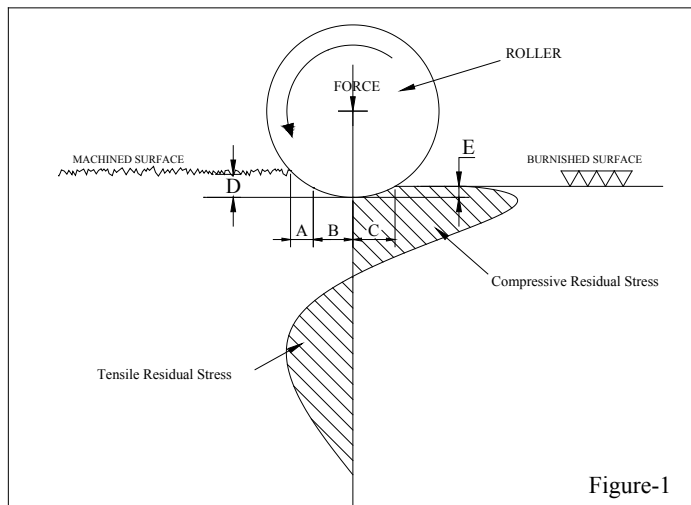
1. Improve the surface finish,
2. Improve the fatigue life,
3. Improve the size control.

The basic idea of the methods is plastic deformation of material by applying a relatively small force so that a hardened layer on the surface exists. Roller Burnishing, Shot Peening, LPB (Low Plasticity Burnishing) are such methods.

If relatively small force is applied using a highly polished roller, which has the translation and rotation actions it will follow a path through the metal surface. This case is called as "Roller Burnishing" operation.

ROLLER BURNISHING

The principle of Roller Burnishing is transferring the force applied on a roller to the surface in a certain path. During the rotation action the contact area is so small that Hertz type pressure occurs on material surface (like roller bearings). This provides low energy and rolling force requirement. Roller Burnishing a metal surface is only possible with specially designed rollers and mandrel - roller combinations.



(Figure-1) presents a pattern diagram of roller burnishing process for a spherical roller. The first contact to the machined surface occurs in section (A). In section (B) the yield point of the surface is exceeded and plastic deformation takes place.

Pressurized depth can be seen here as (D). After the material has been subjected to the maximum compressive strain, in section (C) it begins to elastically relieve (E) through the finishing zone finally leaving with a smooth surface and a compressive residual stress of significant peak value. The stresses formed on the material during the compression decreases towards the center. These stresses reach approximately 1 mm. below the surface increasing surface hardness as a result.

Effects of Roller Burnishing Operation

- Surface roughness value of 0.05-0.10 μm . (R_a) - (ISO N2, N3)
- 0.01 mm or better tolerances
- 30% - 70% increase in Brinell Hardness on surface.
- Up to 300 % increase in resistance to fatigue failure
- Eliminating the factors of stress corrosion cracking
- Increase in corrosion resistance
- Elimination of tool marks, pits, scratches and porosities
- Reduced friction up to 35 %
- Reduced noise level is achieved by eliminating the factors

Usage area of ROBUTO

- Symmetrical / Semi Symmetrical work pieces
 - Internal Cylindrical
 - External Cylindrical
 - Internal Tapered
 - External Tapered
 - Circular flat surfaces
- Can be used on all types of machines (drill presses, lathes, machining centers, or any other rotating spindle).
- Work pieces of max. 40 HRC

Advantages of Roller Burnishing against classical methods.

- Roller Burnishing is a chipless finishing method different than grinding, honing and lapping.
- Surface roughness value of Roller Burnishing operation is less or equal to these abrasive methods. Even the values are equal; roller burnished surface is smoother than the abraded surface because chip-generating operations leaves sharp projections in the contact plane.
- A workpiece with a diameter of 30 mm. and a length of 100 mm. can be burnished in 10 - 15 seconds.
- No expensive investments are required.
- Mechanical advantages. (Corrosion resistance, increase in surface hardness)
- Faster production at a lower cost. 10,000 - 300,000 pieces can be burnished without any maintenance cost.

TOOL APPLICATION

The diameter adjustment of the tool and the operation parameters to control are easy and flexible. Stock allowance, feed rate and speed are the variables that must be set before starting the operation.

Roller Burnishing does not cause any volume change in the workpiece. But because material is displaced, the diameter will be altered somewhat. In Roller Burnishing of a symmetrical surface profile, the diameter will change at most by the value of the peak - to - valley height. This must be allowed at the preceding machining operation by leaving enough stock to compensate for the dimensional change.

(Table-1) is to give an idea about determining the stock allowance for the workpieces of different diameters.

TOOL DIA.(mm)	STOCK ALLOWANCE (mm)
4.5 ~ 7.6	0.005 ~ 0.020
8 ~ 14.5	0.007 ~ 0.025
15 ~ 24	0.015 ~ 0.035
25 ~ 44	0.020 ~ 0.040
45 ~ 74	0.025 ~ 0.045
75 ~ 200	0.030 ~ 0.060

Table-1

Chipless Finishing & Cold Working

Roller Burnishing operation is a chipless finishing method. By the rolling pressure applied to the workpiece surface, the microscopic peaks flow into the valleys in the surface profile. (Figure-2)

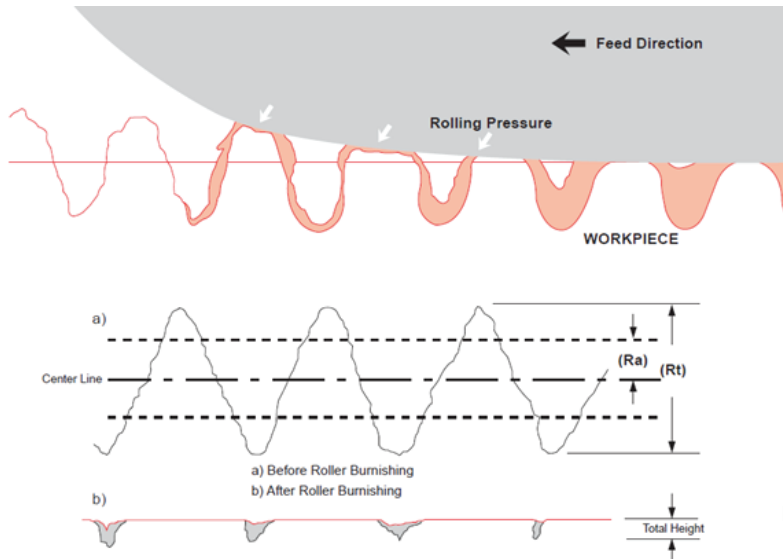


Figure-2

Roller burnishing process cold - works metal surfaces to produce a uniform, dense, low micro surface finish. The fact that ROBUTO (Roller Burnishing Tool) does not remove metal - thus does not produce chips - enables the tool to offer a variety of advantages, most of which are not obtainable with other finishing processes such as reaming, boring, and grinding.

The chipless finishing process, Roller Burnishing cold - works metal under relatively small force. These forces slightly exceeds the yield strength of the material causing a plastic deformation of its surface material. Because the plastic deformation occurs under the recrystallization temperature this process is called cold working.

Minimum Surface Roughness Value (Ra)

In (Table-2), (Ra) values of different materials are listed.

MATERIAL	SURFACE ROUGHNESS - (Ra) μm .	
	Before Roller Burnishing Ra (μm)	After Roller Burnishing Ra (μm)
STEEL	2.5 – 5.0	0.05 – 0.15
CAST IRON	1.5 – 2.5	0.35 – 0.50
ALUMINIUM	2.5 – 3.5	0.10 – 0.20
BRASS	2.5 – 3.5	0.10 – 0.20
BRONZE	2.5 – 3.5	0.15 – 0.20

Increase in Resistance to Fatigue Failure

Because fatigue failure damages are instantaneous and causes major harm, preventions are necessary. Metals can get cracked even the forces applied are very small when compared to the yield point. Experience has shown that notches, sharp changes of section and other forms of stress raisers are dangerous to metals in applications involving dynamic forces.

Roller Burnishing has an effect of smoothing the profiles of sharp surface imperfections like notches and tool marks. Another and more important point is that the Roller Burnishing reduces the harmful effects of dynamic forces by forming compressive residual stresses at the surface of workpiece material.

After Roller Burnishing, at a given depth below the surface, the material is elastically deformed and tries to spring back. This gives rise to compressive stresses at the surface and tensile stresses in the elastically deformed zone. This in turn increases the resistance of the material to fatigue failure, because any external forces must first overcome these residual stresses.

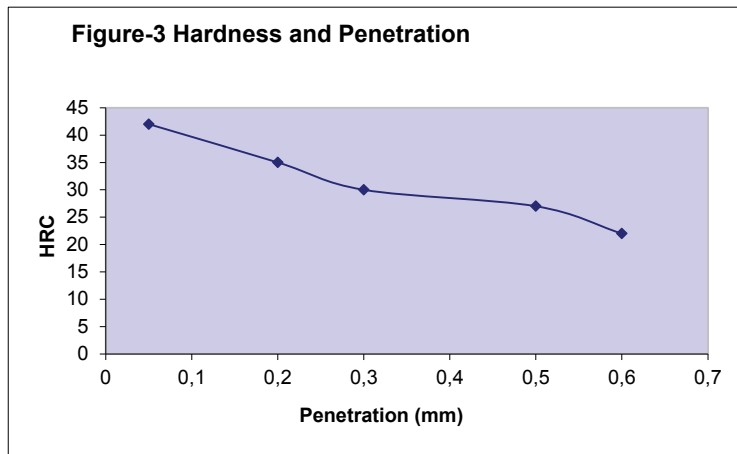
These two major effects of roller burnishing (eliminating the surface imperfections and forming compressive residual stresses) improve the resistance to fatigue failure up to 300%.

Workhardening

Roller burnishing compacts and compresses the workpiece metal where it is contacted by the tool. Subsequently, the grain structure is changed and the part becomes strain hardened. Through this granular dislocation and deformation, the grain size is decreased and the boundary volume is increased in the cold worked area.

Hardness measurement shows a clear hardness increase at the surface, with hardness gradually decreasing to the original value at greater distances from the surface.

In (Figure-3) the relation of surface hardness and penetration of the hardness (distance from surface) is shown.



Increase in surface hardness for different types of materials is shown in (Table-3)

Material	DIA.	Stock Amount	INCREASE OF SURFACE HARDNESS			
			Brinell Hardness (BHN)	% BHN	Rockwell Hardness(HRC)	% HRC
Steel	5	0.012	212 to 286	35	14 to 30	114
	10	0.018				
	25	0.025				
	50	0.050				
Stainless Steel	5	0.012	230 to 400	74	20 to 42	110
	10	0.020				
	25	0.025				
	50	0.040				
Cast Iron	5	0.012	180 to 250	39	6 to 25	315
	10	0.015				
	25	0.025				
	50	0.040				
Aluminium	5	0.015	100 to 120	20	-	-
	10	0.025				
	25	0.040				
	50	0.040				
Bronze	5	0.018	134 to 186	39	-	-
	10	0.025				
	25	0.030				
	50	0.025				

Table-3

Corrosion and Porosities

Workpieces that are roller burnished have high resistance to corrosion. Eliminating the pits, scratches and porosities, which could collect reactive substances and contaminants, provides high corrosion resistance.

A workpiece has the risk of cracking when it is under the affect of both reactive substances and tensile residual stresses. Cracking that occurs due to the interaction between static tensile stresses in the metal and a corrosive medium is called stress corrosion cracking.

During Roller Burnishing, these tensile stresses are eliminated when the material is compressed. Because compressive residual stresses are formed at the surface of the workpiece.

Roller burnishing succesfully removes these factors causing stress corrosion cracking.

CPL SERIES

INTERNAL ROBU TO ROLLER BURNISHING TOOLS



For hole sizes from $\varnothing 3$ to $\varnothing 300$ mm

Standard working lengths up to $\varnothing 31$
Unlimited working length up from $\varnothing 32$

MF – Through Hole - Machine Feeding

SF – Through Hole - Self Feeding

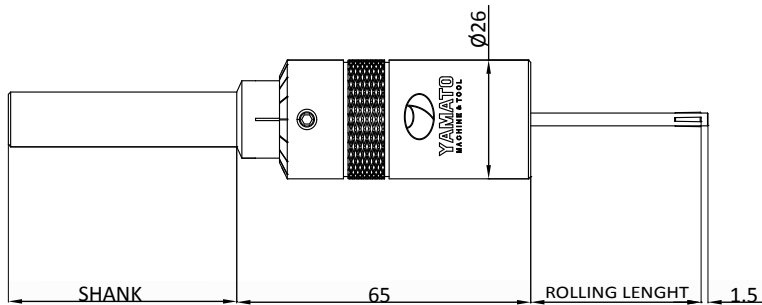
BMF – Blind/Stepped Hole - Machine Feeding

AVAILABLE FROM STOCK

CPL - INTERNAL ROBUOTO

Ø3 - Ø5.75 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
3.00							
3.25							
3.50	-0.05	-0.05	-	1.00	3	-	-
3.75	+0.20	+0.15	-				
4.00							
4.25							
4.50							
4.75							
5.00	-0.05	-0.05	-	1.50	3	-	-
5.25	+0.20	+0.15	-				
5.50							
5.75							



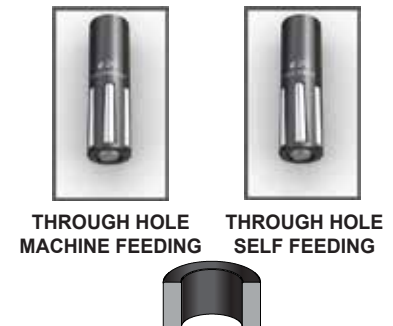
ROLLING LENGTH



SHANK TYPE



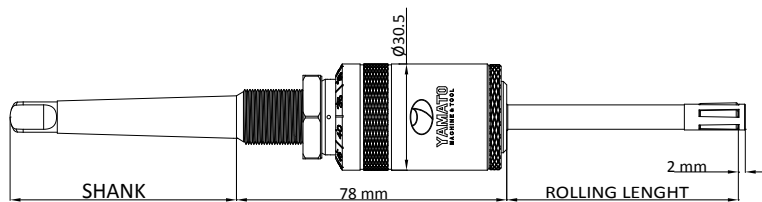
DESIGN VERSION



CPL - INTERNAL ROBUTO

Ø6 - Ø14.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
6.00	-0.10	-0.10	-0.00	1.80	3	1.80	3
6.50	+0.30	+0.25	+0.15				
7.00	-0.10	-0.10	-0.00	2.00	3	2.00	3
7.50	+0.30	+0.25	+0.15				
8.00	-0.10	-0.10	-0.00	2.30	5	2.30	3
8.50	+0.40	+0.30	+0.15				
9.00	-0.10	-0.10	-0.00	2.75	5	2.75	3
9.50	+0.40	+0.30	+0.15				
10.00							
10.50	-0.10	-0.10	-0.00	3.15	5	3.15	3
11.00	+0.40	+0.30	+0.15				
11.50	-0.10	-0.10	-0.00	3.75	5	3.75	3
12.00	+0.40	+0.30	+0.15				
12.50							
13.00							
13.50	-0.10	-0.10	-0.00	3.75	5	3.75	5
14.00	+0.40	+0.30	+0.15				
14.50							



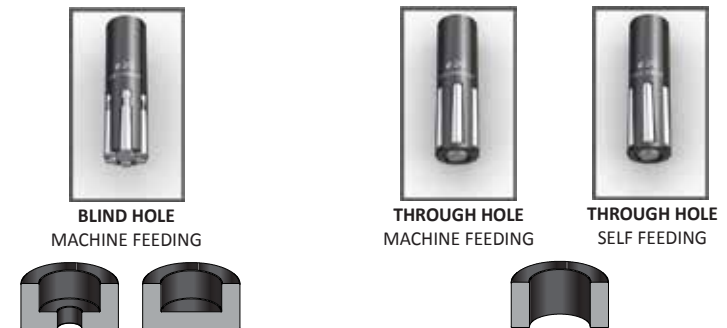
ROLLING LENGTH



SHANK TYPE

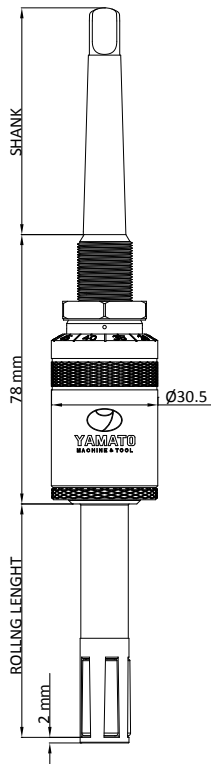


DESIGN VERSION



CPL - INTERNAL ROBUTO Ø15 - Ø15.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
15.00	-0.10	-0.10	-0.00	4.60	5	4.60	4
15.50	+0.40	+0.30	+0.15				



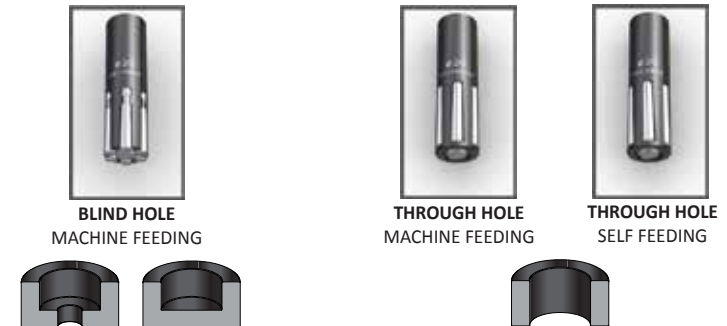
ROLLING LENGTH



SHANK TYPE

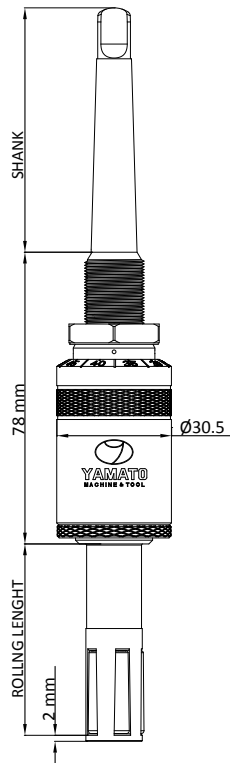


DESIGN VERSION



CPL - INTERNAL ROBUOTO Ø16 - Ø16.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
16.00	-0.10	-0.10	-0.00	4.60	5	4.60	4
16.50	+0.40	+0.30	+0.15				



ROLLING LENGTH



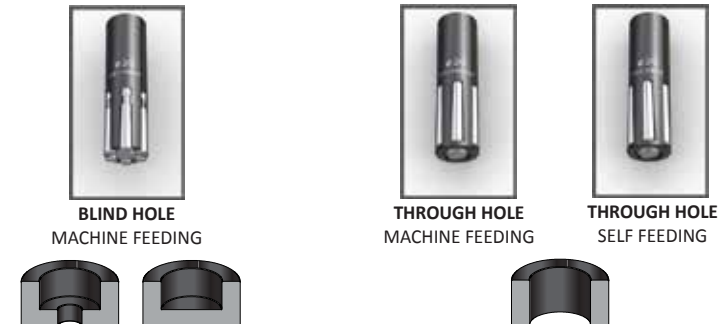
SHANK TYPE

MT 1 SHANK

Ø12 x 50mm

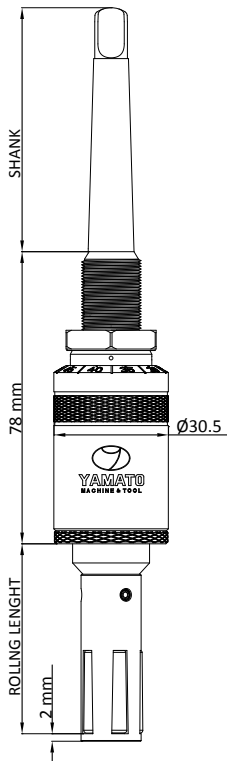


DESIGN VERSION



CPL - INTERNAL ROBUTO Ø17 - Ø21 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
17.00							
17.50	-0.10	-0.10	-0.00	4.60	5	4.60	5
18.00	+0.90	+0.80	+0.25				
18.50							
19.00							
19.50	-0.10	-0.10	-0.00	5.50	5	5.50	5
20.00	+0.90	+0.80	+0.25				
20.50							
21.00							



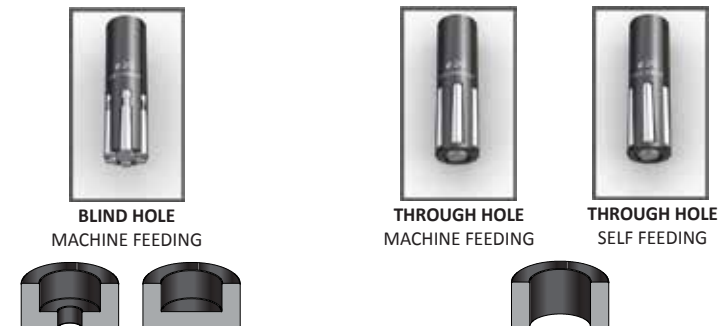
ROLLING LENGTH



SHANK TYPE

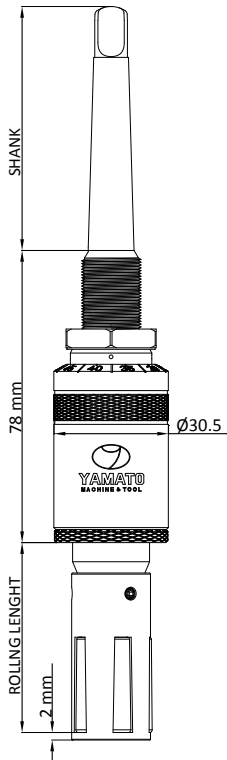


DESIGN VERSION



CPL - INTERNAL ROBUOTO Ø21.5 - Ø24 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
21.50							
22.00							
22.50	-0.10	-0.10	-0.00	5.50	5	5.50	5
23.00	+0.90	+0.80	+0.25				
23.50							
24.00							



ROLLING LENGTH



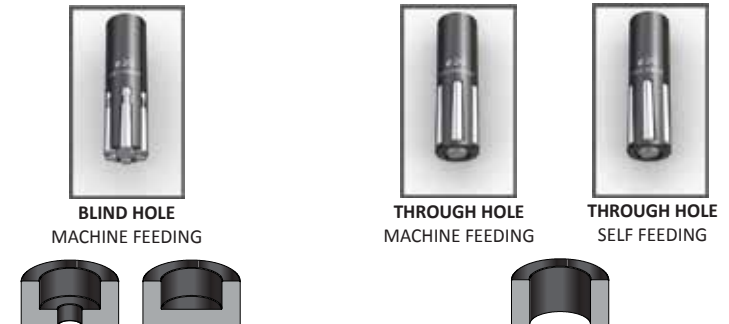
SHANK TYPE

MT 1 SHANK

Ø12 x 50mm

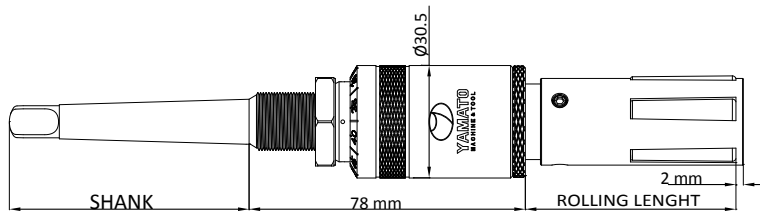


DESIGN VERSION



CPL - INTERNAL ROBUTO Ø24.5 - Ø31.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
24.50							
25.00							
25.50							
26.00	-0.10	-0.10	-0.00	6.70	5	6.70	5
26.50	+0.90	+0.80	+0.25				
27.00							
27.50							
28.00	-0.10	-0.10	-0.00	7.85	5	6.70	5
28.50	+0.90	+0.80	+0.25				
29.00							
29.50							
30.00	-0.10	-0.10	-0.00	7.85	5	7.85	5
30.50	+0.90	+0.80	+0.25				
31.00							
31.50							



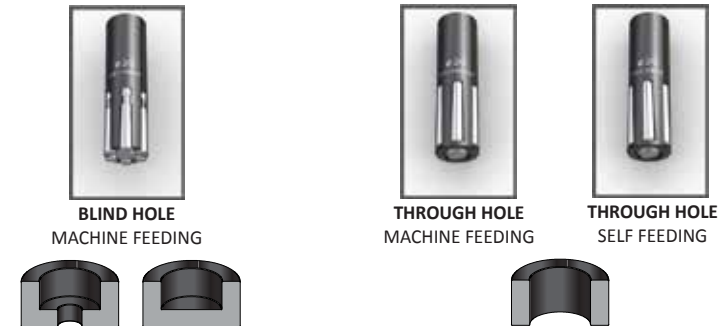
ROLLING LENGTH



SHANK TYPE

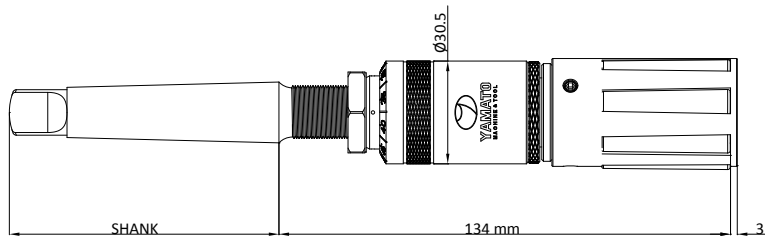


DESIGN VERSION



CPL - INTERNAL ROBUOTO Ø32 - Ø39.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
32.00							
32.50	-0.10	-0.10	-0.00	7.85	5	7.85	5
33.00	+0.90	+0.80	+0.25				
33.50							
34.00							
34.50							
35.00							
35.50							
36.00							
36.50	-0.10	-0.10	-0.00	7.85	7	7.85	5
37.00	+0.90	+0.80	+0.25				
37.50							
38.00							
38.50							
39.00							
39.50							



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 2 SHANK



Ø20 x 50mm



DESIGN VERSION



BLIND HOLE
MACHINE FEEDING



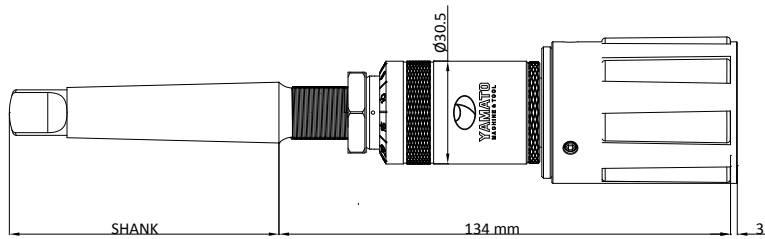
THROUGH HOLE
MACHINE FEEDING



THROUGH HOLE
SELF FEEDING

CPL - INTERNAL ROBUTO Ø40 - Ø49.5 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
40.00							
40.50							
41.00							
41.50							
42.00	-0.10 +0.90	-0.10 +0.80	-0.00 +0.25	10.25	7	10.25	5
42.50							
43.00							
43.50							
44.00							
44.50							
45.00							
45.50							
46.00							
46.50							
47.00	-0.10 +0.90	-0.10 +0.80	-0.00 +0.25	10.25	7	7.85	7
47.50							
48.00							
48.50							
49.00							
49.50							



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 2 SHANK



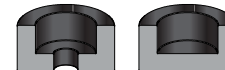
Ø20 x 50mm



DESIGN VERSION



BLIND HOLE
MACHINE FEEDING



THROUGH HOLE
MACHINE FEEDING

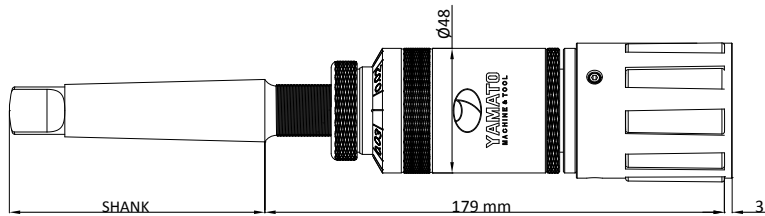


THROUGH HOLE
SELF FEEDING



CPL - INTERNAL ROBUOTO Ø50 - Ø65 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
50.00							
51.00							
52.00	-0.10	-0.10	-0.00	10.25	9	10.25	7
53.00	+0.90	+0.80	+0.25				
54.00							
55.00							
56.00							
57.00							
58.00							
59.00							
60.00	-0.10	-0.10	-0.00	11.85	9	11.85	7
61.00	+0.90	+0.80	+0.25				
62.00							
63.00							
64.00							
65.00							



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 3 SHANK



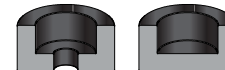
Ø25 x 56mm



DESIGN VERSION



BLIND HOLE
MACHINE FEEDING



THROUGH HOLE
MACHINE FEEDING

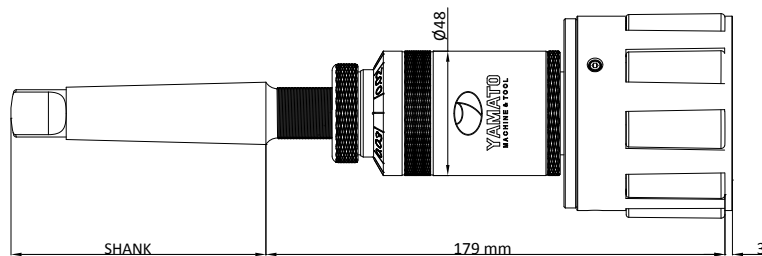


THROUGH HOLE
SELF FEEDING

CPL - INTERNAL ROBUOTO

Ø66 - Ø85 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
66.00							
67.00							
68.00							
69.00							
70.00							
71.00							
72.00							
73.00	-0.10	-0.10	-0.00	13.50	9	13.50	7
74.00	+0.90	+0.80	+0.25				
75.00							
76.00							
77.00							
78.00							
79.00							
80.00							
81.00							
82.00	-0.10	-0.10	-0.00	15.85	9	15.85	7
83.00	+0.90	+0.80	+0.25				
84.00							
85.00							



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 3 SHANK



Ø25 x 56mm



DESIGN VERSION



BLIND HOLE
MACHINE FEEDING



THROUGH HOLE
MACHINE FEEDING

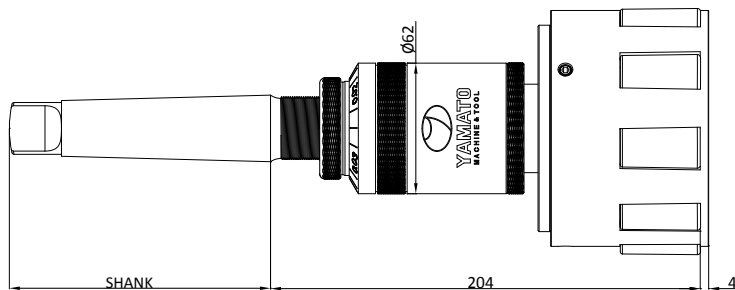


THROUGH HOLE
SELF FEEDING

CPL - INTERNAL ROBUOTO

Ø86 - Ø160 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
86.00	-0.10	-0.10	-0.00	15.85	9	15.85	9
90.00	+0.90	+0.80	+0.25				
95.00							
96.00							
100.00	-0.10	-0.10	-0.00	17.40	9	17.40	9
110.00	+0.90	+0.80	+0.25				
115.00							
116.00							
120.00	-0.10	-0.10	-0.00	20.60	9	20.60	9
125.00	+0.90	+0.80	+0.25				
126.00							
130.00	-0.10	-0.10	-0.00	20.60	11	20.60	11
140.00	+0.90	+0.80	+0.25				
150.00							
151.00	-0.10	-0.10	-0.00	20.60	13	20.60	13
160.00	+0.90	+0.80	+0.25				



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

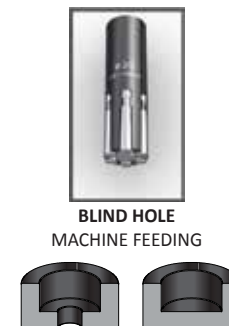
SHANK TYPE

MT 4 SHANK



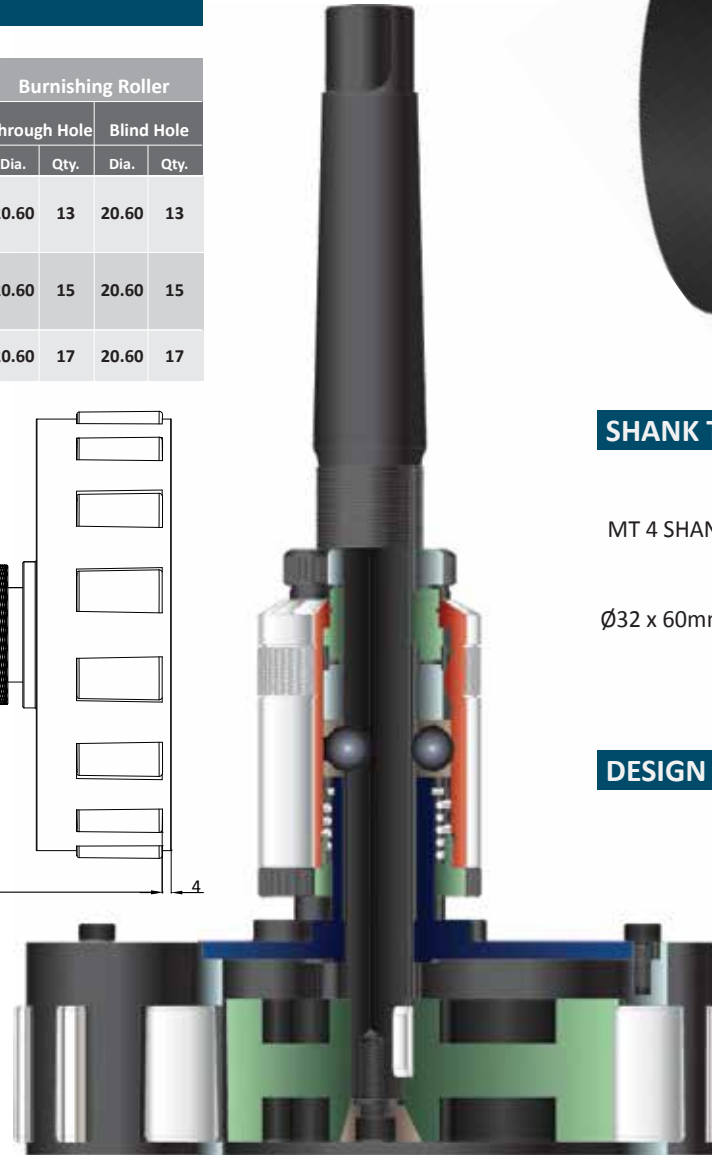
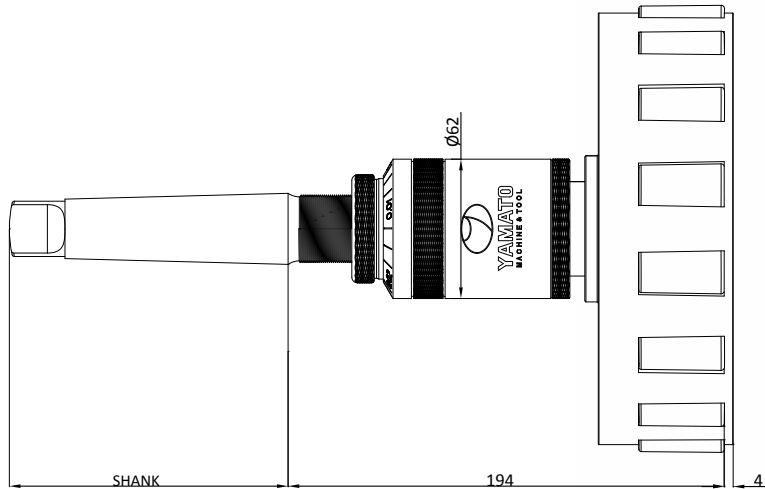
Ø32 x 60mm

DESIGN VERSION



CPL - INTERNAL ROBUOTO Ø161 - Ø225 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
161.00	-0.10	-0.10	-0.00	20.60	13	20.60	13
170.00	+0.90	+0.80	+0.25				
180.00							
181.00	-0.10	-0.10	-0.00	20.60	15	20.60	15
190.00	+0.90	+0.80	+0.25				
200.00							
201.00	-0.10	-0.10	-0.00	20.60	17	20.60	17
225.00	+0.90	+0.80	+0.25				



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 4 SHANK

Ø32 x 60mm



DESIGN VERSION



BLIND HOLE
MACHINE FEEDING



THROUGH HOLE
MACHINE FEEDING

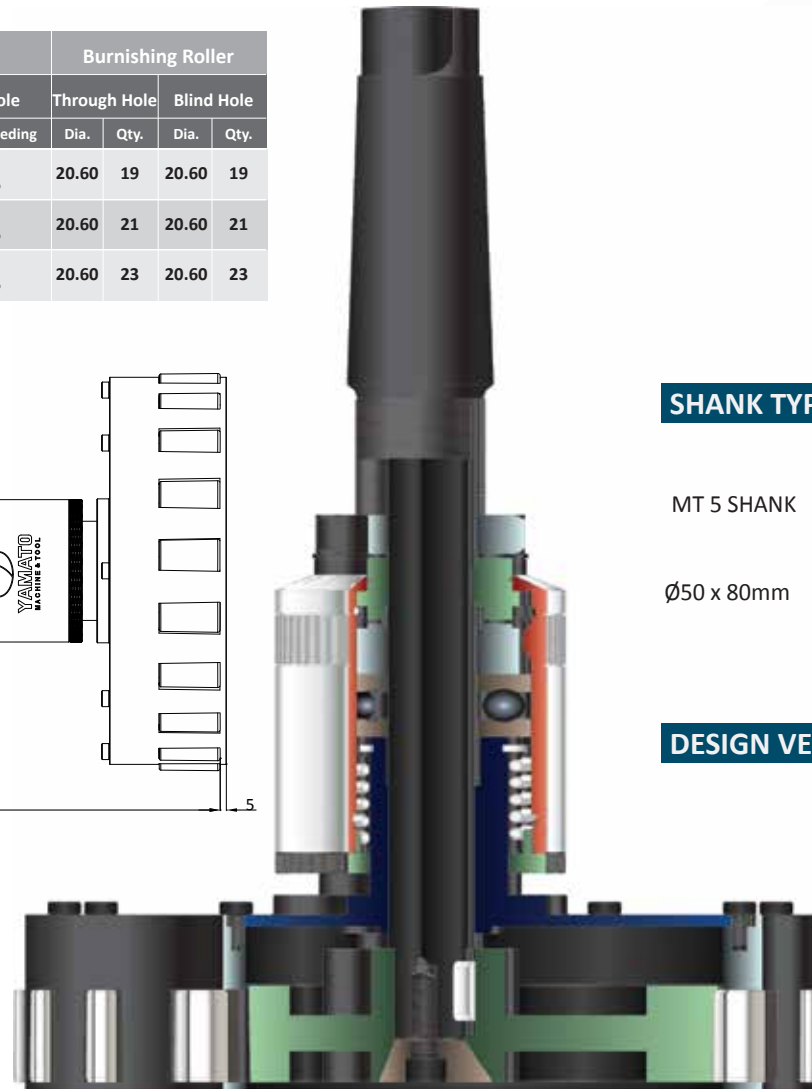
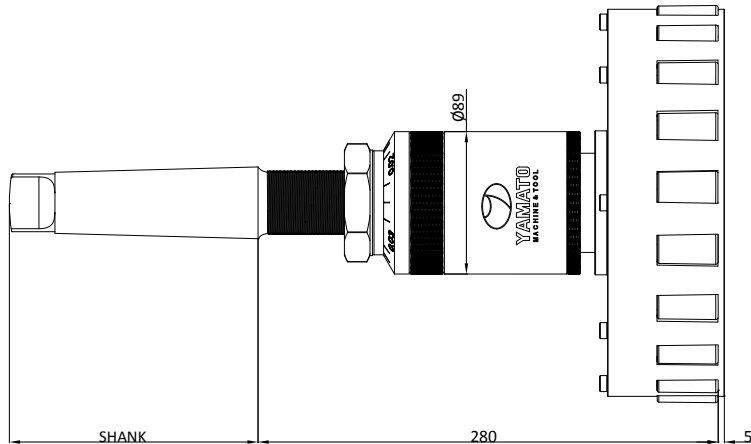


THROUGH HOLE
SELF FEEDING



CPL - INTERNAL ROBUOTO Ø226 - Ø300 mm

TOOL DIA. (mm)	Dia. Setting Range(mm)			Burnishing Roller			
	Through Hole		Blind Hole	Through Hole		Blind Hole	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
226.00	-0.10	-0.10	-0.00	20.60	19	20.60	19
250.00	+0.90	+0.80	+0.25				
251.00	-0.10	-0.10	-0.00	20.60	21	20.60	21
275.00	+0.90	+0.80	+0.25				
276.00	-0.10	-0.10	-0.00	20.60	23	20.60	23
300.00	+0.90	+0.80	+0.25				



ROLLING LENGTH



UNLIMITED ROLLING LENGTH

SHANK TYPE

MT 5 SHANK

Ø50 x 80mm



DESIGN VERSION



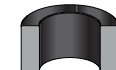
BLIND HOLE
MACHINE FEEDING



THROUGH HOLE
MACHINE FEEDING



THROUGH HOLE
SELF FEEDING



MOD SERIES

EXTERNAL ROBOTO ROLLER BURNISHING TOOLS



For external diameters from $\varnothing 1.5$ to $\varnothing 110$ mm

Unlimited working length with hollow shank

MF- Machine Feeding Tools for straight shafts

SF- Self Feeding Tools for straight shafts

BMF - Machine Feeding Tools for stepped shafts

AVAILABLE FROM STOCK



MOD - EXTERNAL ROBUTO Ø3 - Ø14 mm



UNLIMITED ROLLING LENGTH-
WITH HOLLOW SHANK

TOOL DIA. (mm)	Dia. Setting Range (mm)			Burnishing Roller			
	Straight Shaft		Stepped Shaft	Straight Shaft		Stepped Shaft	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
3.00							
3.50							
4.00							
4.50							
5.00							
5.50	+0.10	+0.10	+0.00	5.50	3	5.50	3
6.00	-0.40	-0.30	-0.15				
6.50							
7.00							
7.50							
8.00							
8.50							
9.00							
9.50							
10.00	+0.10	+0.10	+0.00	5.50	4	5.50	4
10.50	-0.40	-0.30	-0.15				
11.00							
11.50							
12.00							
12.50	+0.10	+0.10	+0.00	5.50	5	5.50	5
13.00	-0.40	-0.30	-0.15				
13.50							
14.00							

SHANK TYPE

MT 2 SHANK
(Max. 78mm Rolling Length)



Hollow Cylindrical Shank
Ø25-Ø16 x 60 mm
(Unlimited Rolling Length)



DESIGN VERSION



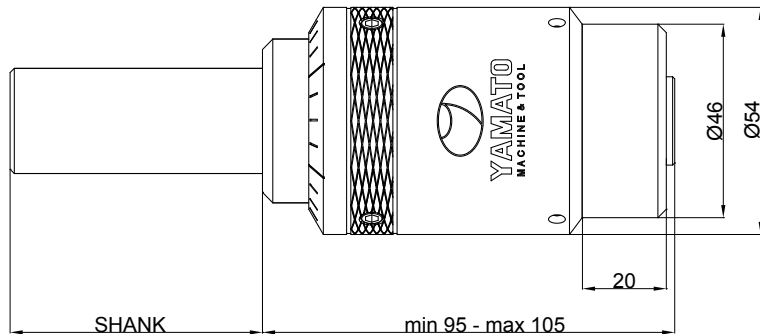
machine feeding
type for straight
shafts



self feeding
type for straight
shafts



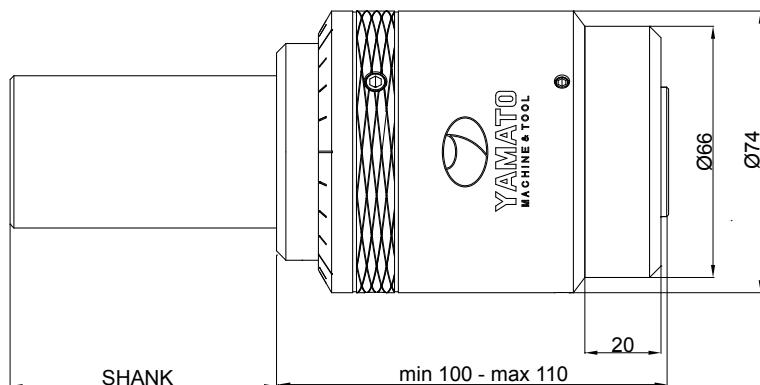
machine feeding
type for stepped
shafts



MOD - EXTERNAL ROBU TO

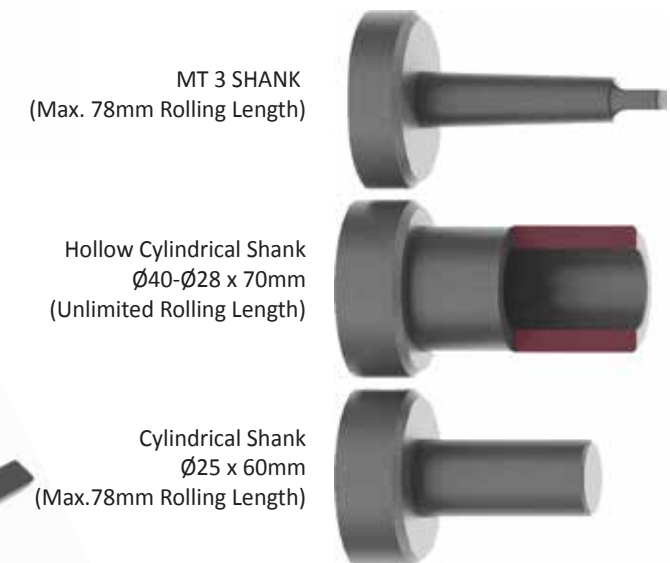
Ø14.5 - Ø25 mm

TOOL DIA. (mm)	Dia. Setting Range (mm)			Burnishing Roller			
	Straight Shaft		Stepped Shaft	Straight Shaft		Stepped Shaft	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
14.50							
15.00							
15.50							
16.00	+0.10	+0.10	+0.00	5.50	5	5.50	5
16.50	-0.40	-0.30	-0.15				
17.00							
17.50							
18.00							
18.50							
19.00							
19.50	+0.10	+0.10	+0.00	5.50	6	5.50	6
20.00	-0.40	-0.30	-0.15				
20.50							
21.00							
21.50							
22.00							
22.50							
23.00	+0.10	+0.10	+0.00	5.50	7	5.50	7
23.50	-0.40	-0.30	-0.15				
24.00							
24.50							
25.00							

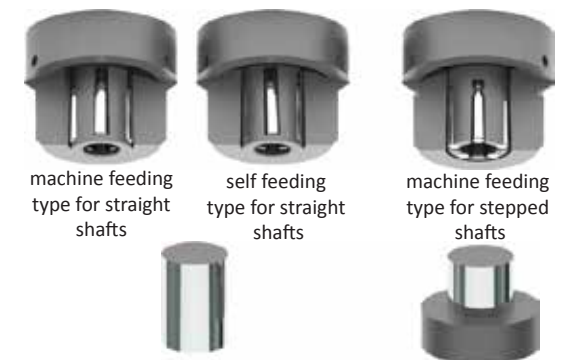


UNLIMITED ROLLING LENGTH
WITH HOLLOW SHANK

SHANK TYPE



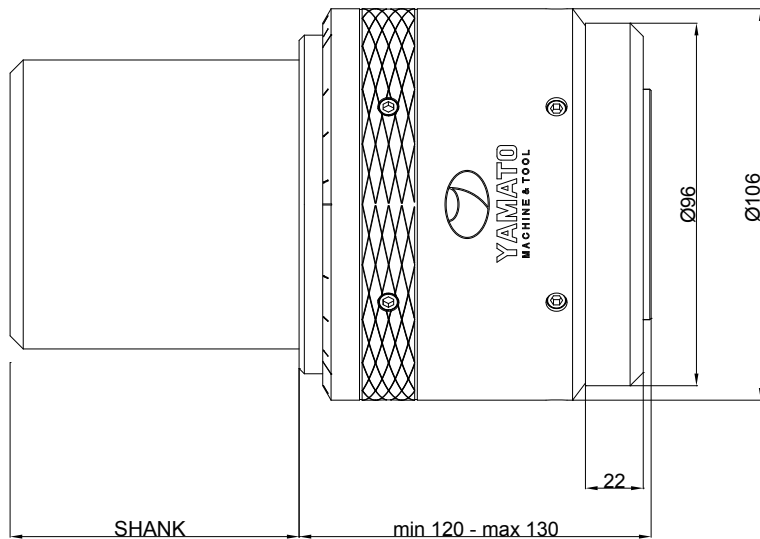
DESIGN VERSION



MOD - EXTERNAL ROBU TO

Ø25.5 - Ø50 mm

TOOL DIA. (mm)	Dia. Setting Range (mm)			Burnishing Roller			
	Straight Shaft		Stepped Shaft	Straight Shaft		Stepped Shaft	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
25.50							
28.00							
30.00	+0.10	+0.10	+0.00	7.85	7	7.85	7
32.00	-0.50	-0.40	-0.15				
35.00							
38.00							
39.00							
40.00	+0.10	+0.10	+0.00	7.85	9	7.85	9
45.00	-0.50	-0.40	-0.15				
50.00							



UNLIMITED ROLLING LENGTH
WITH HOLLOW SHANK

SHANK TYPE

MT 4 SHANK
(Max. 105mm Rolling Length)



Hollow Cylindrical Shank
Ø80-Ø52 x 90mm
(Unlimited Rolling Length)



Cylindrical Shank
Ø40 x 70 mm
(Max. 105mm Rolling Length)



DESIGN VERSION



machine feeding
type for straight
shafts



self feeding
type for straight
shafts



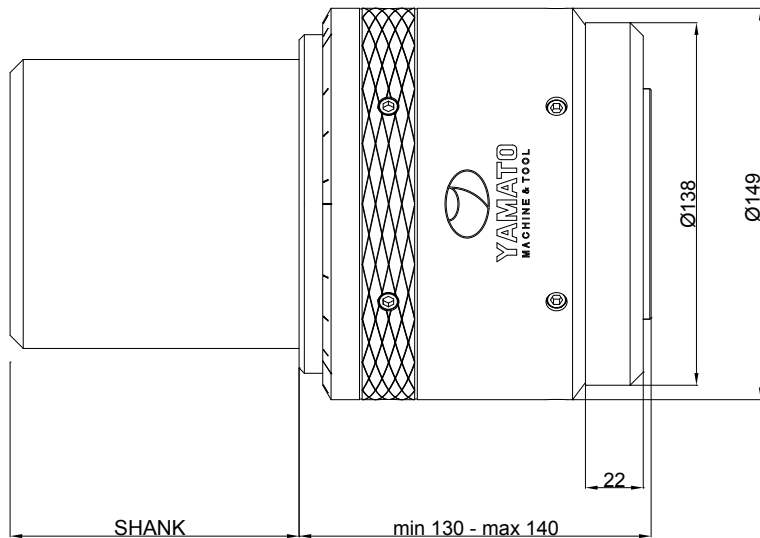
machine feeding
type for stepped
shafts



MOD - EXTERNAL ROBU TO

Ø50.5 - Ø85 mm

TOOL DIA. (mm)	Dia. Setting Range (mm)			Burnishing Roller			
	Straight Shaft		Stepped Shaft	Straight Shaft		Stepped Shaft	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
51.00							
55.00							
60.00	+0.10	+0.10	+0.00	7.85	11	7.85	11
63.00	-0.50	-0.40	-0.15				
65.00							
69.00							
70.00							
75.00	+0.10	+0.10	+0.00	7.85	13	7.85	13
80.00	-0.50	-0.40	-0.15				
85.00							



UNLIMITED ROLLING LENGTH
WITH HOLLOW SHANK

SHANK TYPE

MT 4 SHANK
(Max. 120mm Rolling Length)



Hollow Cylindrical Shank
Ø110-Ø88 x 110mm
(Unlimited Rolling Length)



Cylindrical Shank
Ø40 x 70 mm
(Max. 120mm Rolling Length)



DESIGN VERSION



machine feeding
type for straight
shafts



self feeding
type for straight
shafts



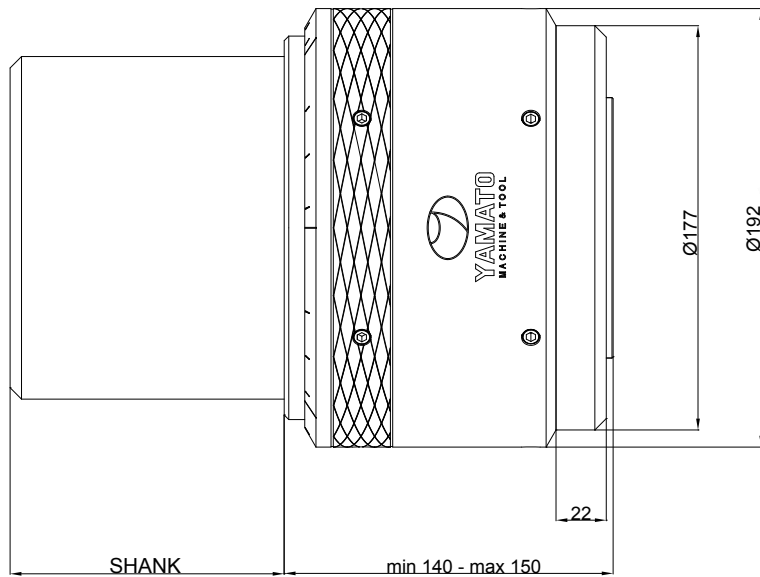
machine feeding
type for stepped
shafts



MOD - EXTERNAL ROBUTO

Ø85.5 - Ø110 mm

TOOL DIA. (mm)	Dia. Setting Range (mm)			Burnishing Roller			
	Straight Shaft		Stepped Shaft	Straight Shaft		Stepped Shaft	
	Self Feeding	Machine Feeding	Machine Feeding	Dia.	Qty.	Dia.	Qty.
86.00	+0.10	+0.10	+0.00	13.50	9	13.50	9
90.00	-0.50	-0.40	-0.15				
95.00							
96.00	+0.10	+0.10	+0.00	13.50	11	13.50	11
100.00	-0.50	-0.40	-0.15				
105.00							
106.00	+0.10	+0.10	+0.00	13.50	13	13.50	13
110.00	-0.50	-0.40	-0.15				



UNLIMITED ROLLING LENGTH
WITH HOLLOW SHANK

SHANK TYPE

MT 5 SHANK
(Max. 127mm Rolling Length)



Hollow Cylindrical Shank
Ø150-Ø113 x 120mm
(Unlimited Rolling Length)



Cylindrical Shank
Ø50 x 80 mm
(Max. 127mm Rolling Length)



DESIGN VERSION



machine feeding
type for straight
shafts



self feeding
type for straight
shafts



machine feeding
type for stepped
shafts

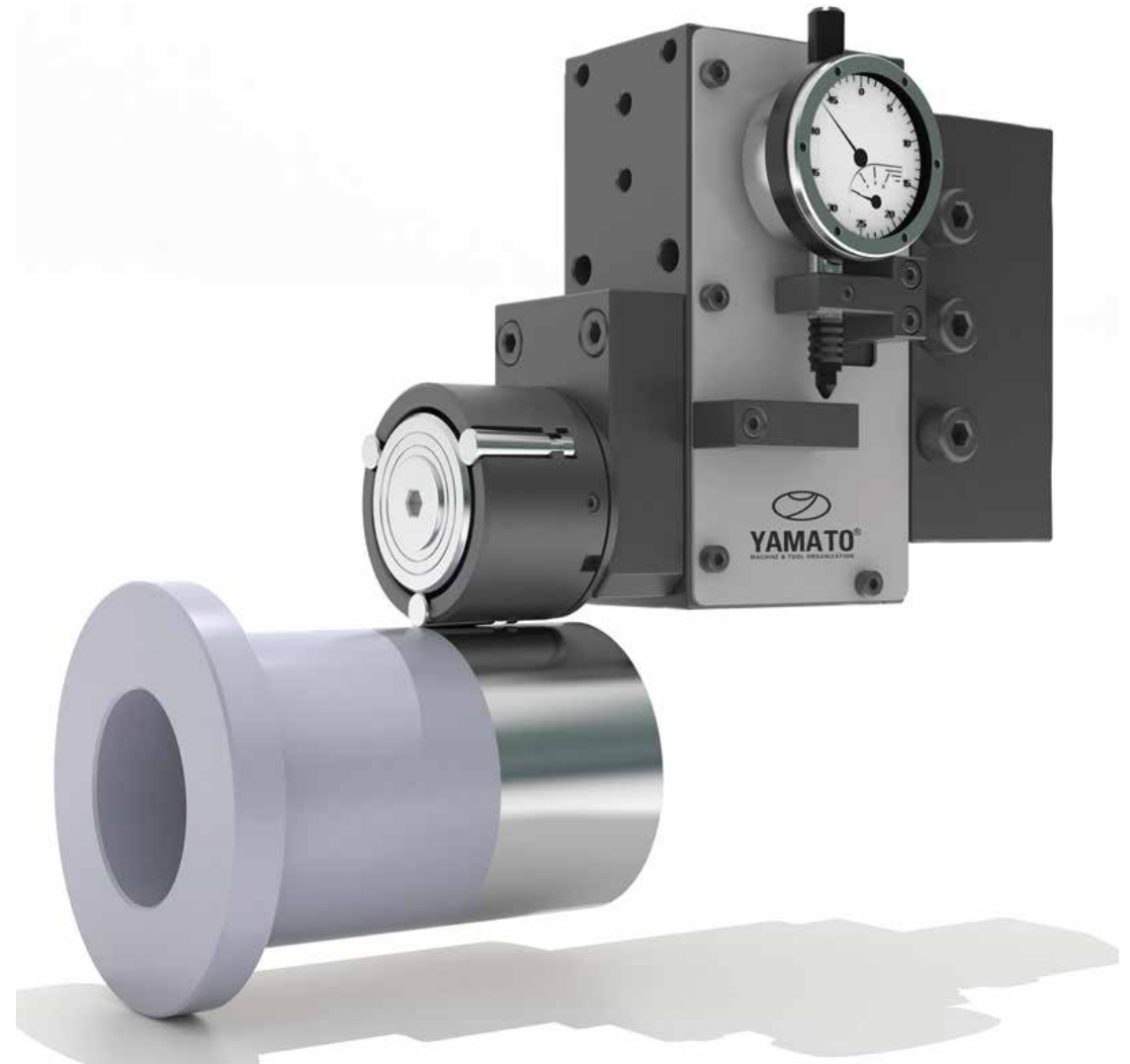


SKUV SERIES

SKUV tools consist of a body, a rolling unit and a shank.
Shanks and rolling units are designed for specific applications.

Patented body design allows the rolling unit to move with very **low friction**.

SINGLE ROLL ROBUTO



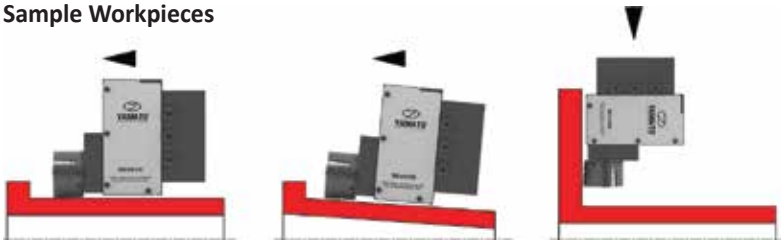
SKUV20-SINGLE ROLL ROBOTO

SKUV20-03295-001

FROM TAILSTOCK TOWARDS CHUCK SHORT

- Suitable for metals (steel, aluminium, copper etc) with tensile strength up to 1400N/mm² and max. hardness of HRC45.
- Roller head is flexible, because the tool is equipped with a spring.
- For use with either CNC-controlled or conventional lathes.
- Can be used on interrupted surface. Thanks to preload system.
- Achievable surface quality min. Ra0.02 µm.
- Unrestricted roller face for roller burnishing shoulders and other edges.
- Roller can rotate in either direction.

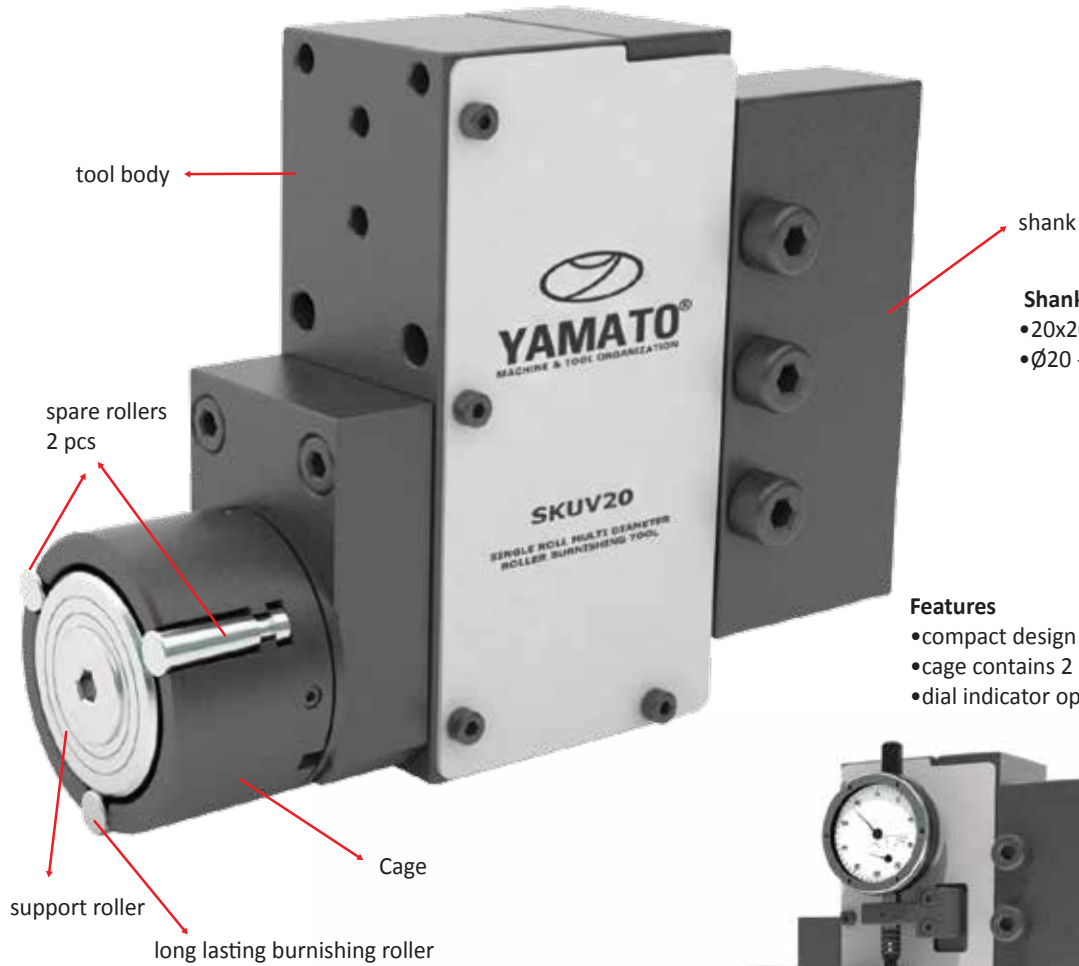
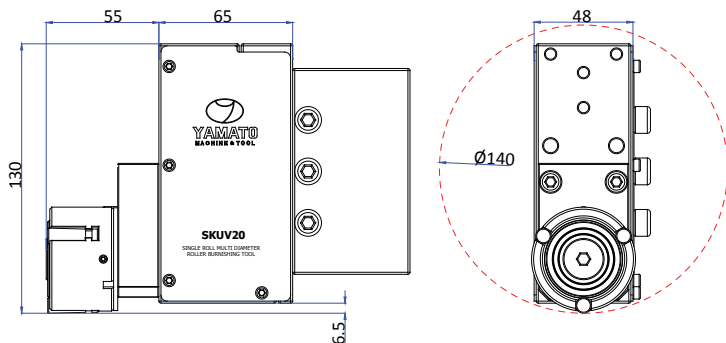
Sample Workpieces



External Diameters and Holes (min. Ø 140)

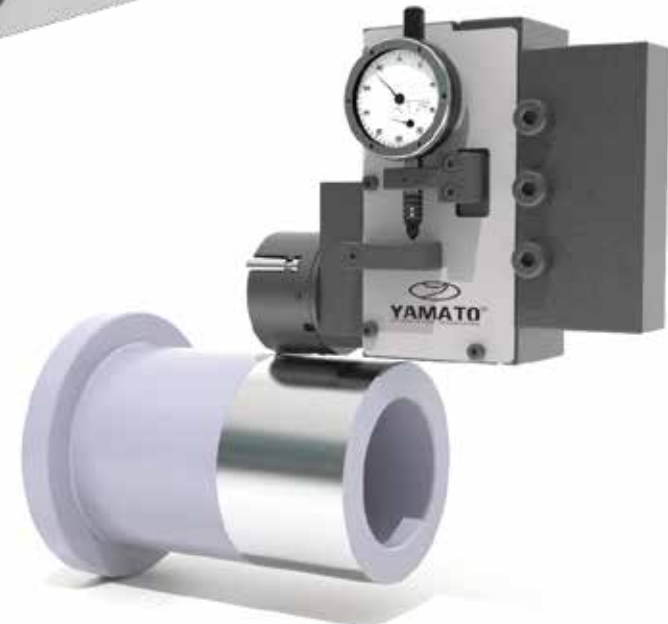
Tapered External Surfaces

Faces



- Shank Type**
- 20x20 – 25x25 square shank
 - Ø20 - Ø25 weldon shank

- Features**
- compact design
 - cage contains 2 spare burnishing rollers
 - dial indicator option



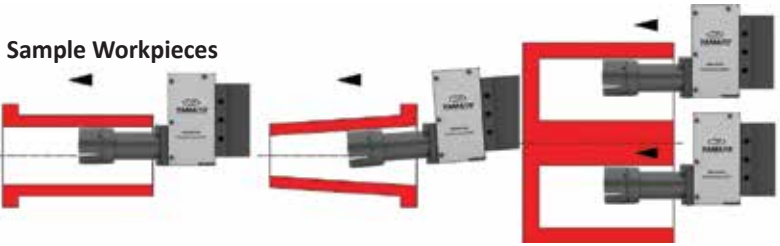
SKUV20-SINGLE ROLL ROBOTO

SKUV20-03295-002

HOLE

- Suitable for metals (steel, aluminium, copper etc) with tensile strength up to 1400N/mm² and max. hardness of HRC45.
- Roller head is flexible, because the tool is equipped with a spring.
- For use with either CNC-controlled or conventional lathes.
- Can be used on interrupted surface. Thanks to preload system.
- Achievable surface quality min. Ra0.02 µm.
- Unrestricted roller face for roller burnishing shoulders and other edges.
- Roller can rotate in either direction.

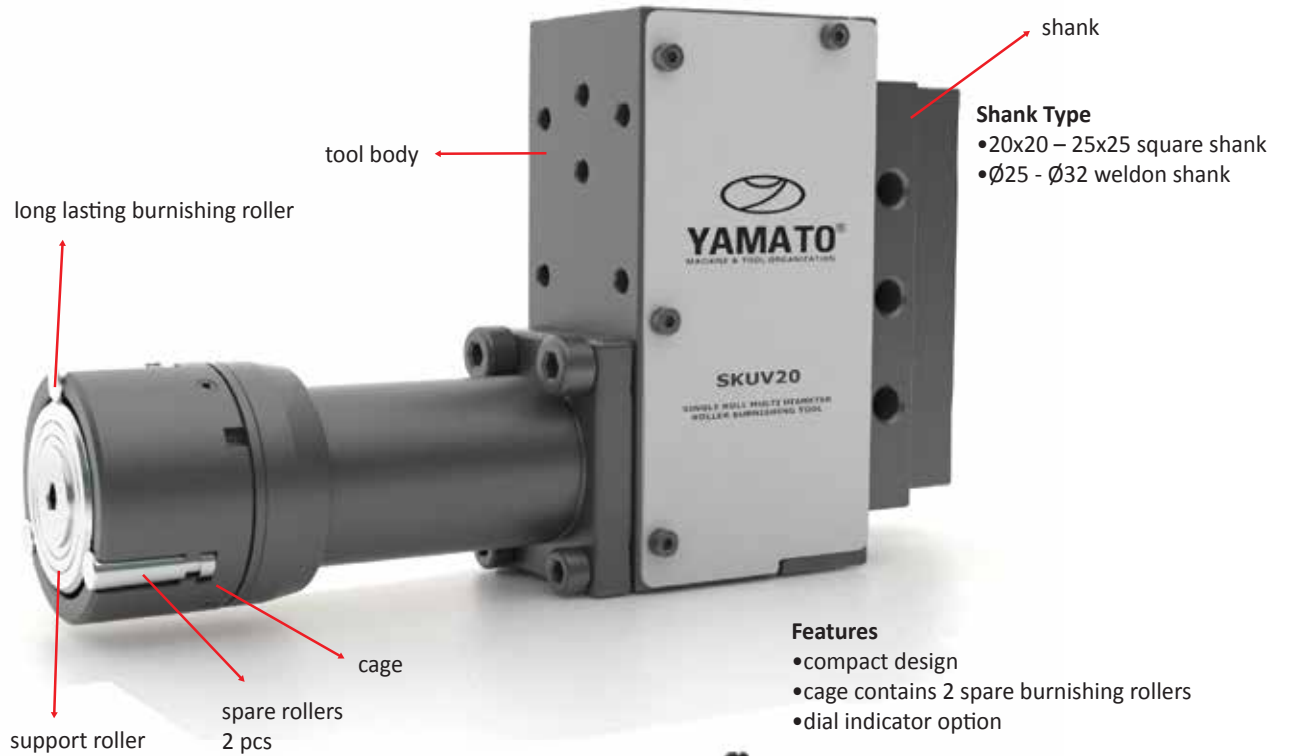
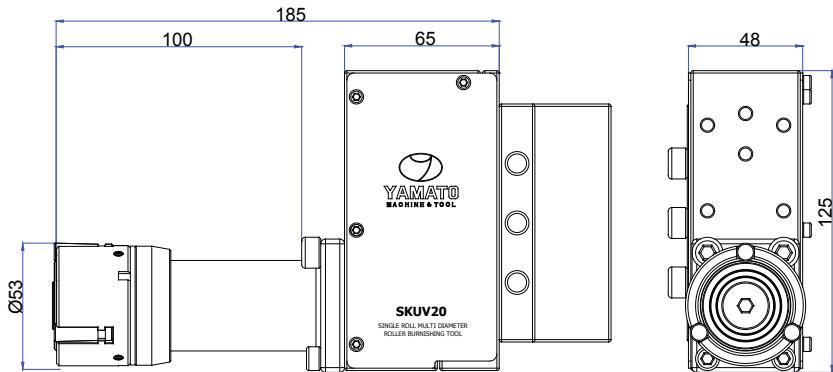
Sample Workpieces



Holes
(min. $\phi 55\text{mm}$)

Tapered Internal
Surfaces

Grooves on Face



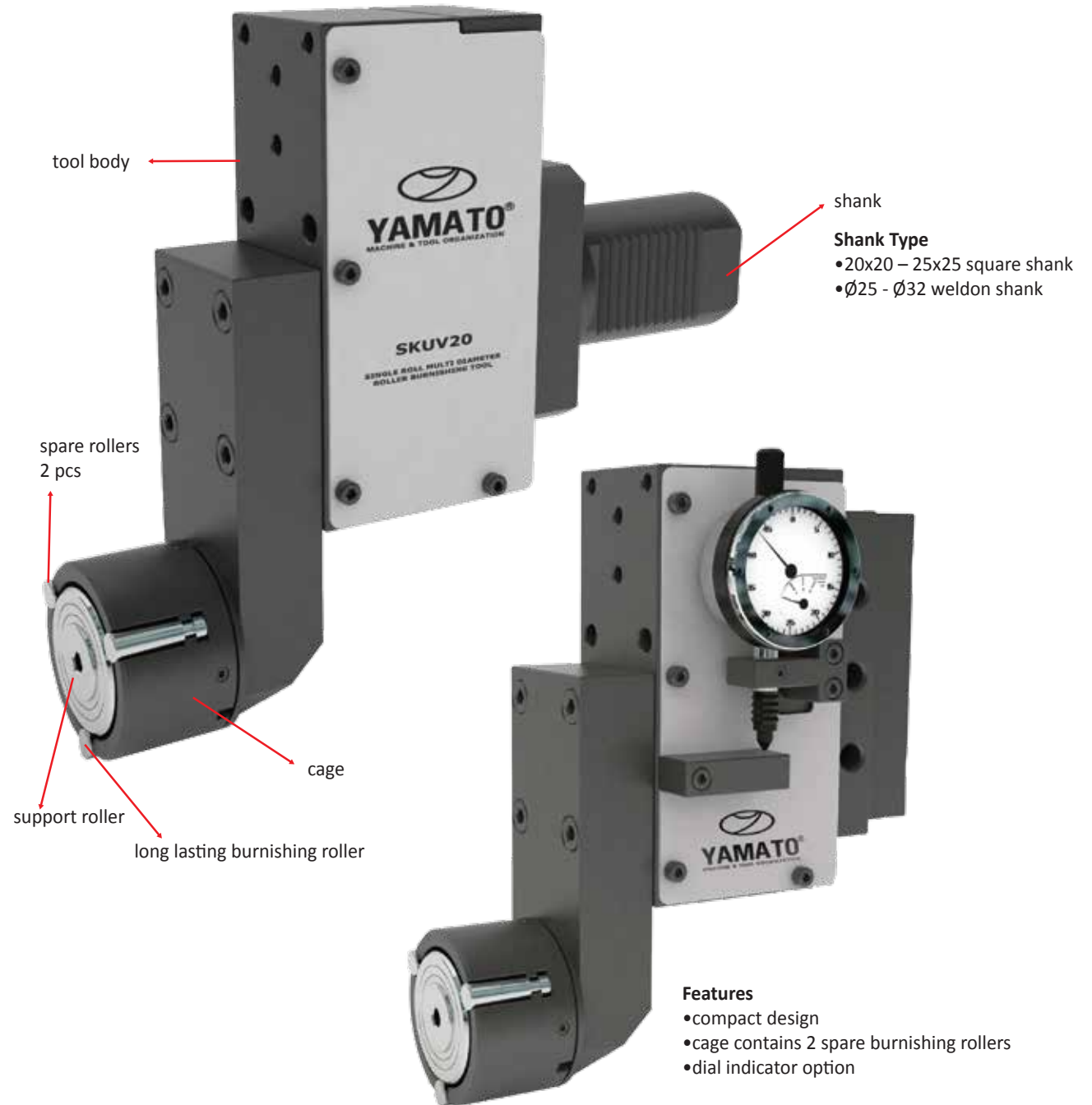
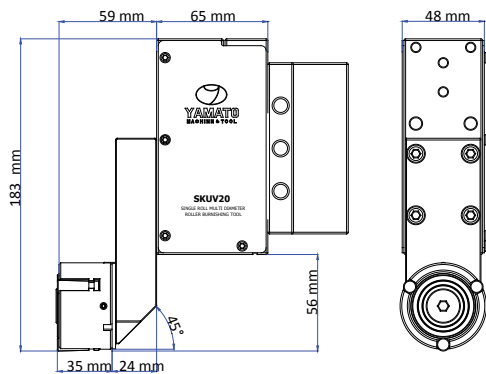
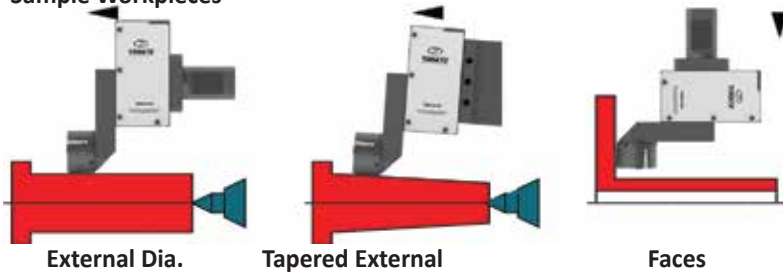
SKUV20-SINGLE ROLL ROBOTO

SKUV20-03295-003

FROM TAILSTOCK TOWARDS CHUCK LONG

- Suitable for metals (steel, aluminium, copper etc) with tensile strength up to 1400N/mm² and max. hardness of HRC45.
- Roller head is flexible, because the tool is equipped with a spring.
- For use with either CNC-controlled or conventional lathes.
- Can be used on interrupted surface. Thanks to preload system.
- Achievable surface quality min. Ra0.02 µm.
- Unrestricted roller face for roller burnishing shoulders and other edges.
- Roller can rotate in either direction.

Sample Workpieces



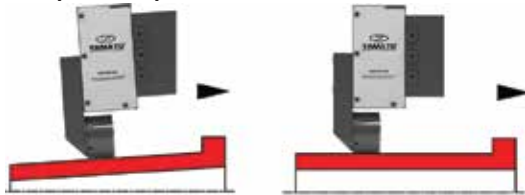
SKUV20-SINGLE ROLL ROBOTO

SKUV20-03295-004

FROM CHUCK TOWARDS TAILSTOCK LONG

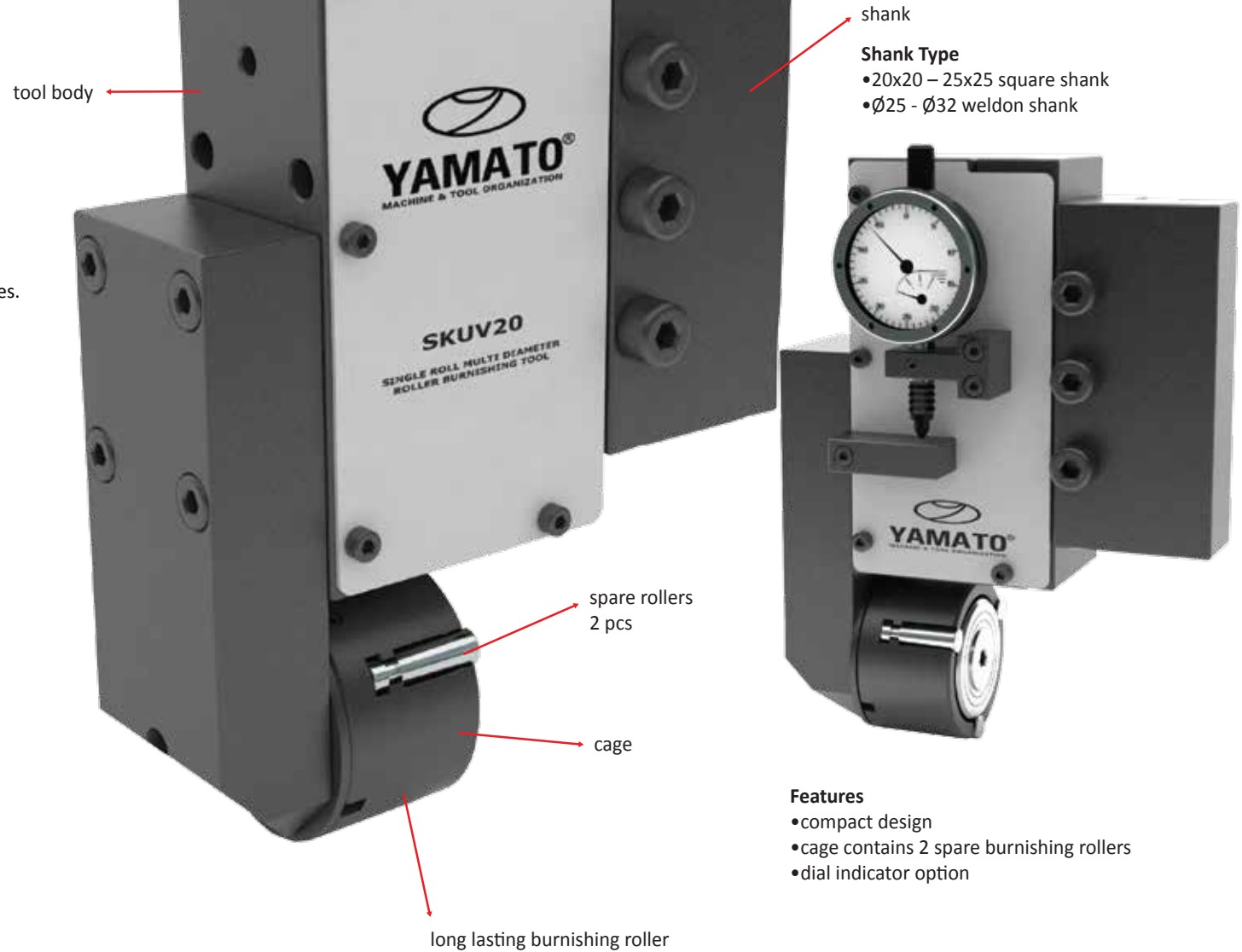
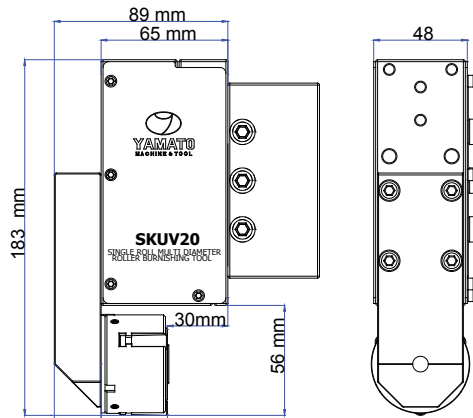
- Suitable for metals (steel, aluminium, copper etc) with tensile strength up to 1400N/mm² and max. hardness of HRC45.
- Roller head is flexible, because the tool is equipped with a spring.
- For use with either CNC-controlled or conventional lathes.
- Can be used on interrupted surface. Thanks to preload system.
- Achievable surface quality min. Ra0.02 µm.
- Unrestricted roller face for roller burnishing shoulders and other edges.
- Roller can rotate in either direction.

Sample Workpieces



Tapered External

External Dia.



Features

- compact design
- cage contains 2 spare burnishing rollers
- dial indicator option

SKUV-R- SINGLE ROLL RADIUS ROBOTO

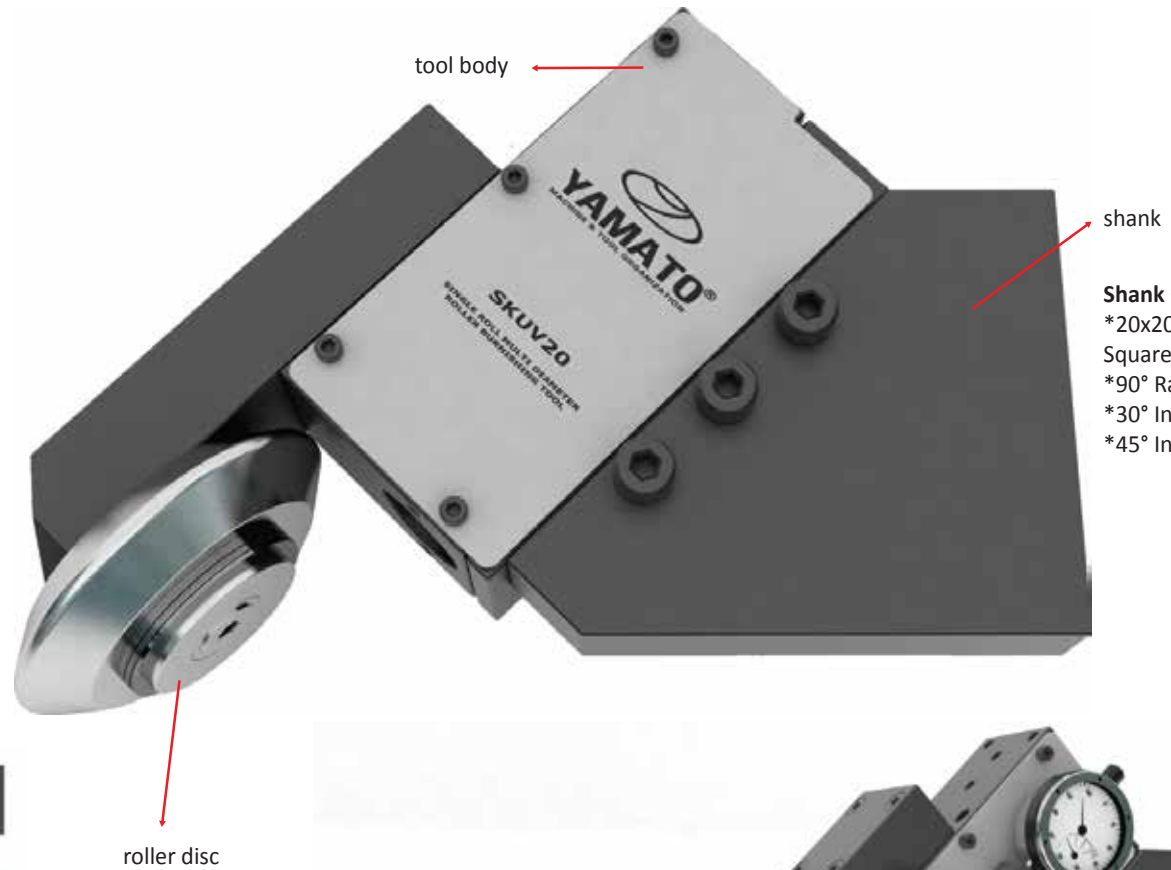
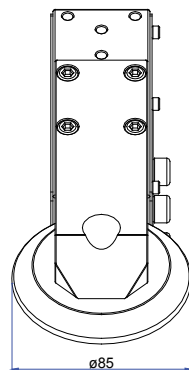
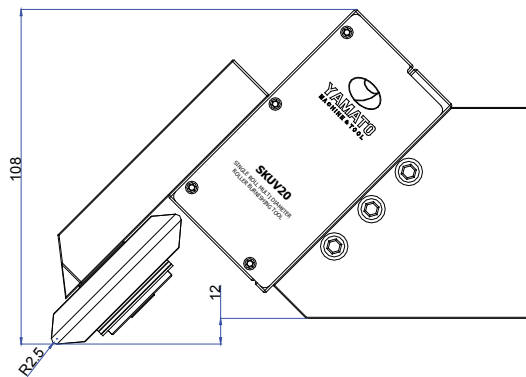
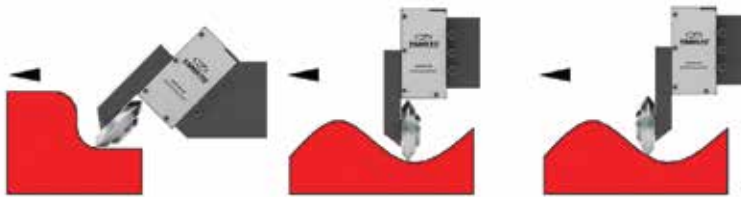
SKUV20-2.5R80-001

30°-45°-90° INCLINED SHANKS

Features

- Standard radius is R2.5 mm.
- Roller disc with special radius is available.
- Shank with different inclination is available.
- Diameter of roller disc is $\varnothing 85$ mm.

Sample Workpieces



- Shank Options**
- *20x20 – 25x25
 - Square shank
 - *90° Radial shank
 - *30° Inclined shank
 - *45° Inclined shank

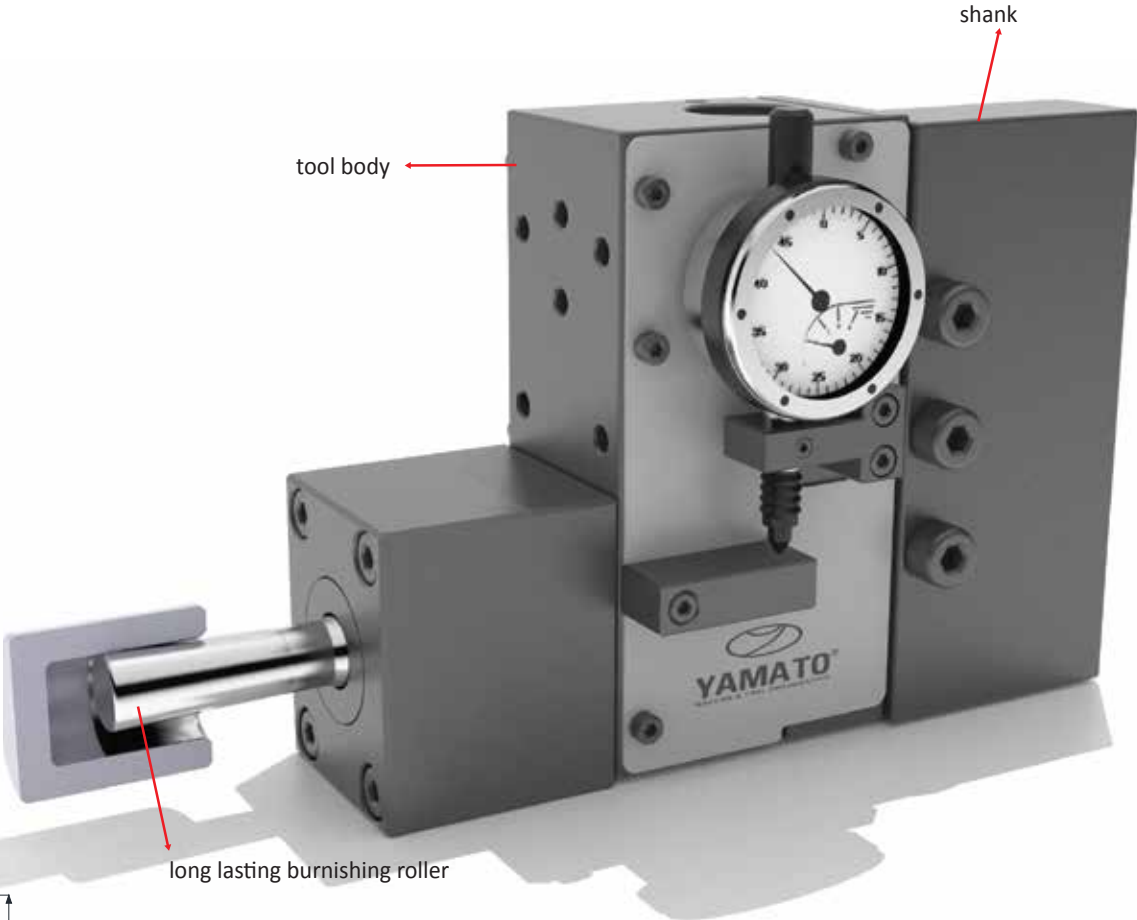
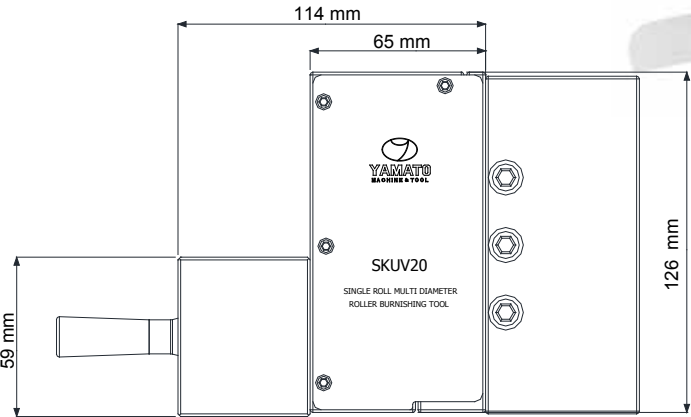
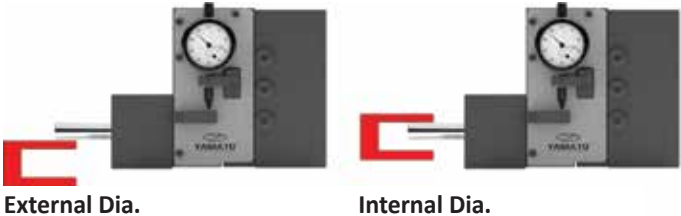


SKUV20-SINGLE ROLL ROBOTO

SKUV20-01XXX-LXX.X

- Suitable for metals (steel, aluminium, copper etc) with tensile strength up to 1400N/mm² and max. hardness of HRC45.
- Roller head is flexible, because the tool is equipped with a spring.
- For use with either CNC-controlled or conventional lathes.
- Can be used on interrupted surface. Thanks to preload system.
- Achievable surface quality min. Ra0.02 µm.
- Unrestricted roller face for roller burnishing shoulders and other edges.
- Roller can rotate in either direction.

Sample Workpieces



- Shank Type**
- 20x20 – 25x25 square shank
 - Ø25 - Ø32 weldon shank

- Features**
- compact design
 - dial indicator option

SKUV OPTIONS

COOLANT NOZZLE

Direct coolant flow on the contact point between roller and workpiece.



DIAL INDICATOR SET

All SKUV20 single roll tools can be equipped with dial indicator that indirectly measures the burnishing force.



SKUV 20 SPECIAL APPLICATIONS

Deep rolling with SKUV tools increases the fatigue strength of dynamically loaded parts. Because of eliminating the surface imperfections and forming compressive residual stresses, resistance to fatigue failure is improved up to %300.



SAMPLE WORKPIECES



O-Ring grooves or grooves with special profiles can be roller burnished with SKUV tools.

SAMPLE WORKPIECES



SKUV 20 SPECIAL APPLICATIONS

SPECIAL TOOL SUITABLE FOR YOUR WORKPIECE & LATHE IS AVAILABLE WITH
VERY SHORT DELIVERY AND PRICE.

LONG VERSION
with single small burnishing roller



SHORT VERSION
with single large burnishing roller



FOR SMALL HOLES



SPECIAL STEPPED ADAPTER

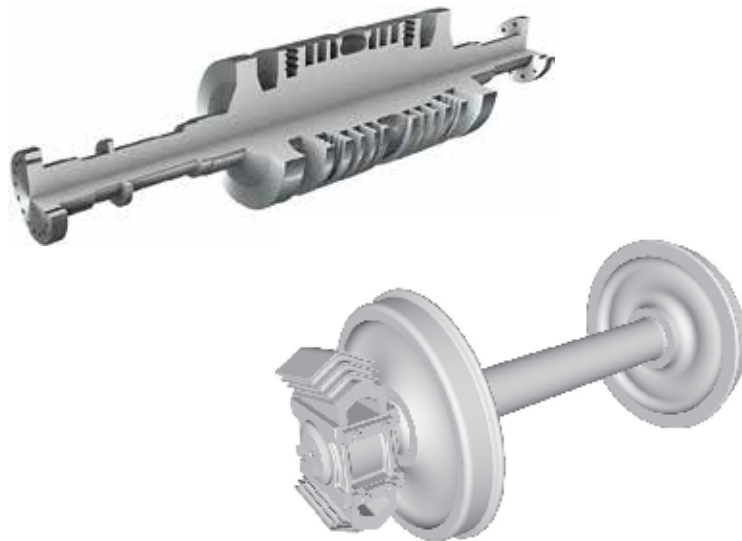


SKUV 30 DEEP ROLLING ROBOTO

SKUV30 has been engineered for Deep Rolling applications on surfaces and radiuses of highly stressed work-pieces such as

- transport axles,
- train axles,
- transmission shafts,
- propeller shafts,
- turbine shafts, etc.

SAMPLE WORKPIECES



SKUV30 can apply 10KN of pressure with 90° shank and over 5KN of pressure with 45° inclined shank with an extremely long life and reliability of both the roll and the internal mechanism.

Improvements of the mechanical resistance from the compression residual surface stresses include:

- Increase of surface hardness
- Lower surface Ra
- Elimination of stress factors, corrosion, cracks
- Increased corrosion resistance
- Elimination of working signs, scratches, porosity
- Less Friction
- Less noise levels

MIC INTERNAL ANGULAR ROBUTO

Angular roller burnishing tools are designed to burnish conical sections with uniform tapers which are symmetrical with the axis of the workpiece. These surfaces are generally sealing surfaces, and require high quality finishes to control leakage.

Roller burnishing of conical surfaces is much faster and less expensive than grinding and honning, and eliminates problems with embedded abrasive which can wear out the sealing element. Typical sealing surfaces in parts include: face seats, angular or tapered seats of internal or external construction.

YAMATO ROBUTO® Tools are designed with tapered rolls for true planetary rolling action to prevent skidding effect and produce a superior burnished surface.



SMALLEST TOOLS FOR MICRO WORKS



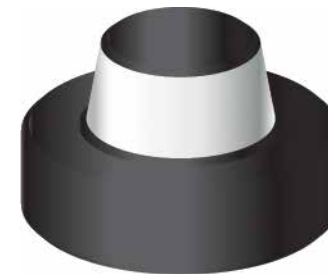
MOC

EXTERNAL ANGULAR ROBUTO

Angular roller burnishing tools are designed to burnish conical sections with uniform tapers which are symmetrical with the axis of the workpiece. These surfaces are generally sealing surfaces, and require high quality finishes to control leakage.

Roller burnishing of conical surfaces is much faster and less expensive than grinding and honing, and eliminates problems with embedded abrasive which can wear out the sealing element. Typical sealing surfaces in parts include: face seats, angular or tapered seats of internal or external construction.

YAMATO ROBUTO® Tools are designed with tapered rolls for true planetary rolling action to prevent skidding effect and produce a superior burnished surface.

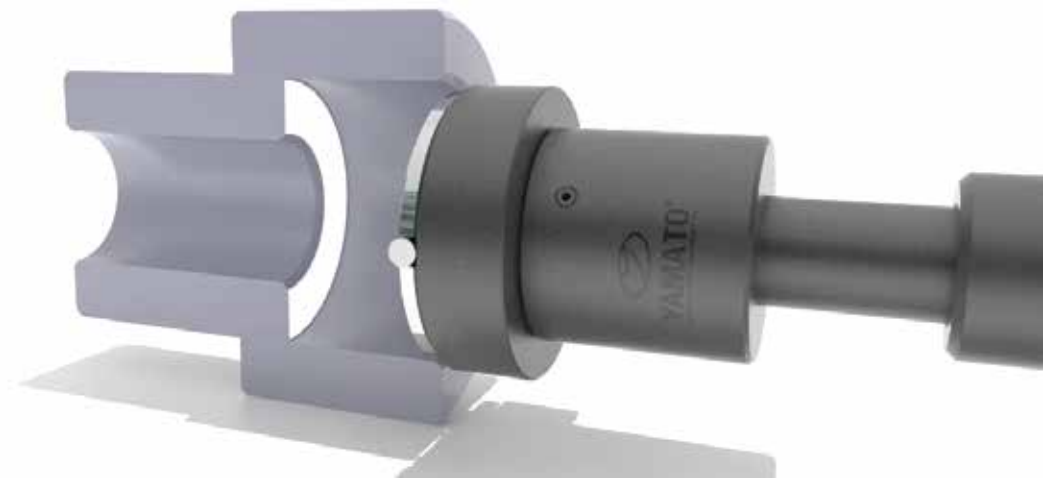


MFF FLAT FACE ROBUTO

Flat Face roller burnishing tools are designed to burnish circular faces which are symmetrical with the axis of the workpiece. These surfaces are generally sealing surfaces, and require high quality finishes to control leakage.

Roller burnishing of flat surfaces is much faster and less expensive than grinding and honing, and eliminates problems with embedded abrasive which can wear out the sealing element. Typical sealing surfaces in parts include: face seats, angular or tapered seats of internal or external construction.

YAMATO ROBUTO® Tools are designed with tapered rolls for true planetary rolling action to prevent skidding effect and produce a superior burnished surface.



MICRO ROBUTO

MICROMOD - Swiss Type External Robuto

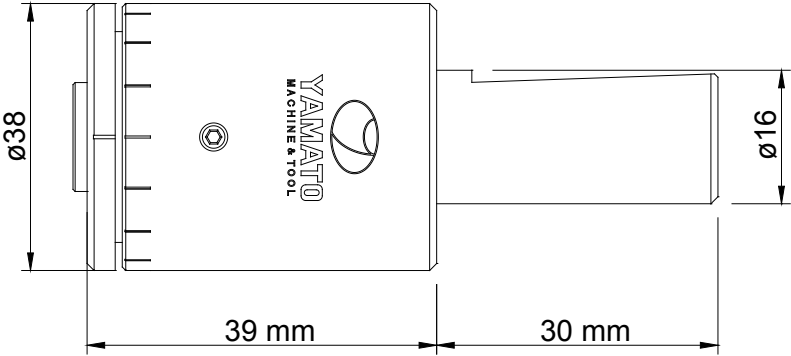
External diameters miniature Roller Burrnishing Tools for Swiss Lathes

Their short length allows them to be used on the reduced spaces in Swiss Lathes. With MICROMOD all the working can be done directly on the CNC machine avoiding the high cost and waste of time for secondary workings. The tools shown are examples, we can do a full customization to meet customer needs. (even shorter than the ones shown).



MICROMOD

Total length out of the chuck" is only 39 mm. and the tool body diameter is only Ø38 mm. This dimensions are 95 mm and Ø54 mm. respectively on standard Roller Burnishing Tools



MICRO ROBUTO

MICROID - Swiss Type Internal Robuto

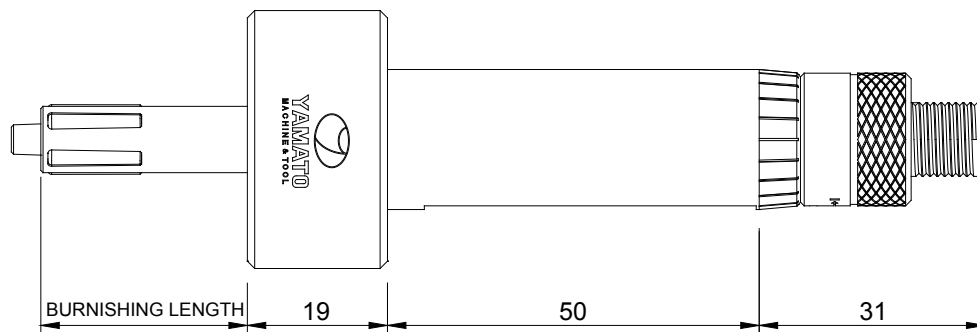
Internal diameters miniature Roller Burnishing Tools for Swiss Lathes.

Their short length allows them to be used on the reduced spaces in Swiss Lathes. With MICROID all the working can be done directly on the CNC machine avoiding the high cost and waste of time for secondary workings. The tools shown are examples, we can do a full customization to meet customer needs. (even shorter than the ones shown).

MICRO Tool Series offer a rear adjustment mechanism which allows the effective length of the tool to be kept compact.



MICROID

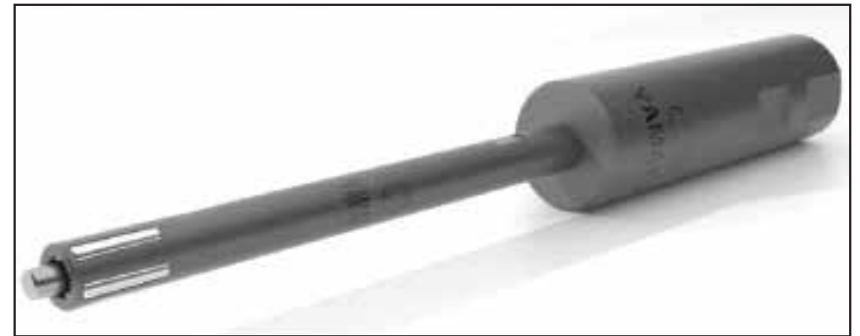


"Total length out of the chuck" is equal to ["burnishing length" + 19 mm]
 This value is equal to ["burnishing length" + 75 mm] on standard Roller Burnishing Tools

CMID Internal Compensating Robuto

Compensating Tool (CMID) with pressure control unit produces excellent results. When part size varies and primary requirement is surface finish.

Different from standard Roller Burnishing Tools, Compensating Tool can adjust its diameter automatically for small diameter change ratios.



YDB Diamond Robuto

YDB can easily work many different materials with hardness up to 60/65 HRC. YDB can pass through the workpiece surface like a normal chip removal tool. It must be used with coolant.

Obtained finishing depends on some variables such as the kind of material, hardness, finishing before burnishing, working speed and pressure, but generally values from 0.3 to 0.08 can be achieved. YDB models depending on the application and customized models can be supplied.

External Surface



Internal Surface

FOR SMALL AND SHORT HOLES



FOR BIG AND LONG HOLES



GRV Multi Purpose Single Roll Roboto

Different than other single roll tools, GRV can flex in 2 directions.

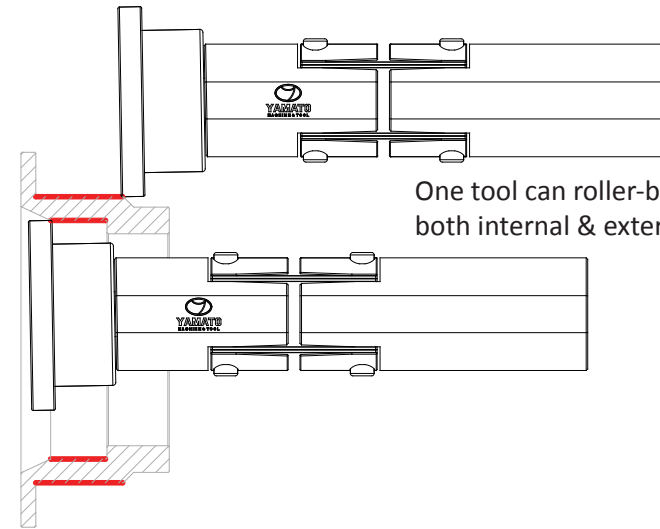
- * One tool can roller-burnish both internal & external diameters at a single setup
- * One tool can roller-burnish both internal & external faces at a single setup
- * Grooves on faces or diameters can be roller-burnished

JUST IMAGINE

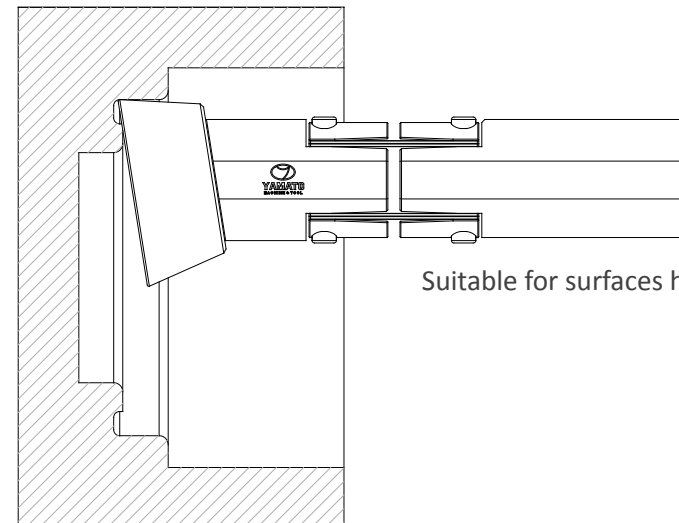
INTERNAL GROOVE APPLICATION



MANY SMALL HOLES CAN BE BURNISHED WITH SINGLE TOOL



One tool can roller-burnish both internal & external diameters at a single setup



Suitable for surfaces hard to reach.

BSBT Boring Bar Style Robuto

Tool body has a spring inside which creates the burnishing force . BSBT is different than other single roll tools because the free angle of the roller can be adjusted by the operator. This way burnishing pressure can be changed while the burnishing force is constant.

Extension shanks are available for longer workpieces



- Tools are engineered to use on machining centers.
- Dia adjustment range is wide.
- Delivered with 3 different arms:

1. Arm for workpieces between $\varnothing 150 \sim \varnothing 190$
2. Arm for workpieces between $\varnothing 180 \sim \varnothing 250$
3. Arm for workpieces between $\varnothing 240 \sim \varnothing 370$

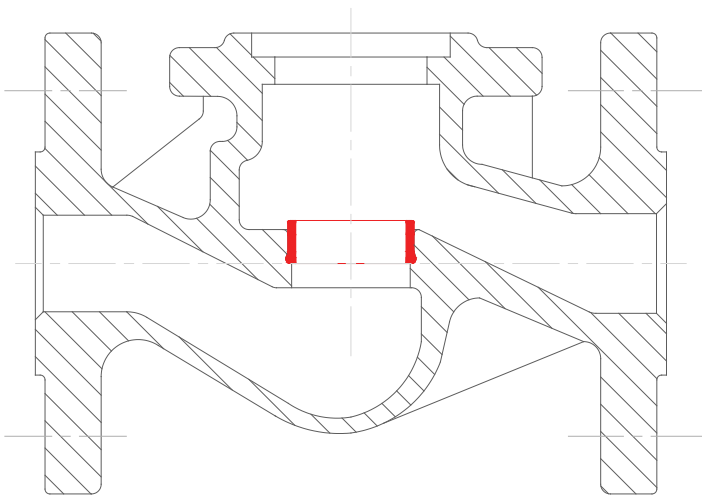
- Shanks are available with different sizes.

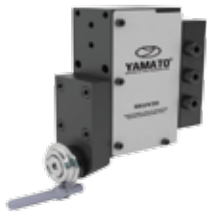
EPCPL EXPANDER Expander for Valve Seat

Seating rings are expanded by using the Valve Seat Expander. During the operation tool rotates and taper inside the tool comes out. This action enlarges the tool diameter and expands seat ring diameter. At the end of the tapers travel expansion is completely round and absolutely tight.

Since valves differ in their series and the seating rings sometimes have somewhat different dimensions, the expansion ranges of the expanders have not been stated. Therefore, we kindly request that you supply us with exact details, including dimensional sketches or drawings, when enquiring or ordering.

Sample Workpiece





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