

Burnishing

Burnishing

TOOLS & MACHINES

**SIZE, FINISH & WORK HARDEN
IN SECONDS**



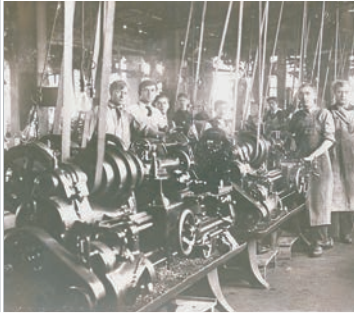
FEATURING COMPLETE TOOL AND SPARE PART NUMBERS



COGSDILL

THE LEADER IN HOLE FINISHING SOLUTIONS

FOR THE WORLDWIDE MACHINE TOOL INDUSTRIES



In 1914 Stuart A. Cogsdill set up shop in Detroit as a cutting tool regrinding and repair service. He soon began designing and manufacturing special tools for early automotive pioneers such as Henry Ford and the Dodge brothers, who relied on Cogsdill to develop innovative tooling solutions for tough manufacturing problems.

Currently owned and operated by the second and third generation of Stuart Cogsdill's descendants,

Cogsdill offers its 21st century customers the same commitment that inspired its founder: we will develop and build innovative tooling solutions for your tough manufacturing problems.

Cogsdill has two operating units, one in the United

States and one in the United Kingdom:

■ Cogsdill Tool Products, Inc. of Camden,
South Carolina, USA - corporate headquarters

■ Cogsdill-Nuneaton Ltd. of Nuneaton, England -
subsidiary of Cogsdill Tool Products



TOOLMAKERS
SINCE
1914

Burnishing

Burnishing TOOLS & MACHINES

contents

2	OVERVIEW OF ROLLER BURNISHING
6	INTERNAL ROLLER BURNISHING TOOLS (MULTI-ROLL)
6	SR Series Roll-a-Finish® Tools
17	U Series Roll-a-Finish® Tools
20	EXTERNAL ROLLER BURNISHING TOOLS (MULTI-ROLL)
20	AEX Series Roll-a-Finish® Tools
27	MICRO ROLLER BURNISHING TOOLS (MULTI-ROLL)
28	Internal – MR Series
29	External – EMR Series
30	ROLL-A-FINISH® TOOL SELECTION AND ORDERING
31	PART PREPARATION AND OPERATING PARAMETERS
36	SPECIAL APPLICATIONS AND TOOL DESIGNS
38	BEARINGIZING TOOLS
43	CX® EXTERNAL ROLLER BURNISHING MACHINES
43	Machine Overview
49	CX Race Assembly
52	SINGLE CONTACT BURNISHING TOOLS
52	Diamond Burnishing Tools
57	Universal™/Single Roll Burnishing Tools
66	KB® KNURLING TOOLS
68	BURNISHING APPLICATION DATA SHEET

Roller burnishing

overview

Cogsdill Roll-a-Finish tools offer you a fast, clean, and economical method of sizing and finishing metal parts to exacting specifications. The tools can be operated on any spindle. Parts of virtually any configuration and material are accurately sized within “tenths,” with surface finishes as fine as 2 micro-inches (0.05 micrometers)... *in seconds!* An additional benefit: roller burnishing work hardens the part surface, producing a dense, compacted, wear-resistant surface for longer part life. Parts are improved, with faster production, and at a lower cost.



Burnishing TOOLS & MACHINES

Universal Burnishing Tools



Boring-Bar Style



Turning-Holder Style

Bearingizing Tools



External Roll-a-Finish® Tools



Internal Roll-a-Finish® Tools



Diamond Burnishing Tools



CX® External Roller Burnishing Machines

We are pleased to offer the widest array of standard burnishing products in the industry, supported by the broadest range of experience in application engineering and custom tool design. Let us provide you with burnishing solutions to meet your sizing and finishing needs, with faster production and at a lower cost.

COGDILL TOOL PRODUCTS, INC.

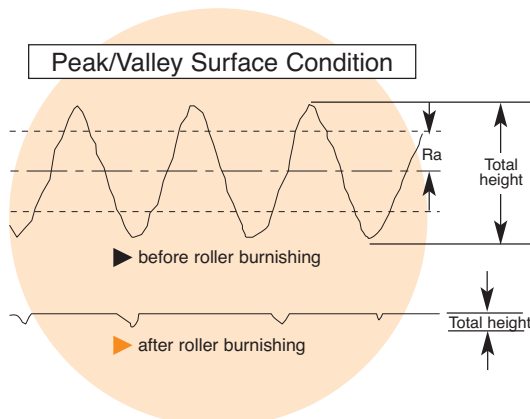
Burnishing products shown here are *not* to scale.



Roller burnishing is a surface finishing technique in which hardened, highly polished steel rollers are brought into pressure contact with a softer work-piece. As the pressure generated through the rollers exceeds the yield point of the work-piece material, the surface is plastically deformed by cold flowing of sub-surface material. The result is a mirror-like finish and a tough, work-hardened surface with load-carrying characteristics which make the burnished surface superior to finishes obtained by abrasive metal-removal methods.

A roller burnished surface is smoother and more wear-resistant than an abraded surface of the same profilometer reading. Profilometers measure roughness height. Abrasive finishing processes remove metal by cutting or tearing it away, and while this usually lowers the roughness profile, it leaves sharp projections in the contact plane of the machined surface.

Roller burnishing displaces metal, rather than removing it. Material in microscopic “peaks” on the machined surface is caused to cold flow into the “valleys,” creating a plateau-like profile in which sharpness is reduced or eliminated in the contact plane. A burnished surface is therefore smoother than an abraded surface with the same roughness height measurement. The burnished surface will last longer under working conditions in contact with a mating part.



Process advantages and benefits of burnishing

There are *four primary benefits* of the roller burnishing process:

- 1 Improved surface finish – as fine as 2 to 4 microinch (Ra)
- 2 Improved size control – tolerances within .0005 inch (.01mm) or better
- 3 Increased surface hardness – up to 5 to 10% or more
- 4 Improved fatigue life – as much as 300% or better

Other benefits include:

- Reduced friction
- Reduced noise level
- Enhanced corrosion resistance
- Elimination of tool marks and minor surface imperfections
- Replaces expensive secondary operations, such as grinding, honing, or lapping
- Cleaner than honing or other abrasive operations
- Faster production, at a lower cost, as compared to other finishing processes – parts are sized, finished, and work-hardened... in seconds!

CX

external roller burnishing machines

burnishing tools

diamond

Roll-a-Finish® tools for all types of part configurations

Cogsdill Roll-a-Finish tools are applied to a wide variety of part configurations, including:

- Inside diameters (holes)
- Outside diameters (shafts)
- Flat surfaces
- Tapers
- Spherical surfaces and contours
- Fillets (radii at shoulders)

Standard Roll-a-Finish tools are available from stock for inside diameters from .156 to 4.000 inches (3.96 to 101.6mm), and for outside diameters from .062 to 2.000 inches (1.57 to 50.8mm). The tools are easily adjustable over a typical range of up to .040 inch (1.02mm). Special designs are available for larger and smaller diameters, and for tapers, faces, contours, and virtually any part configuration.

Other Cogsdill burnishing tool products

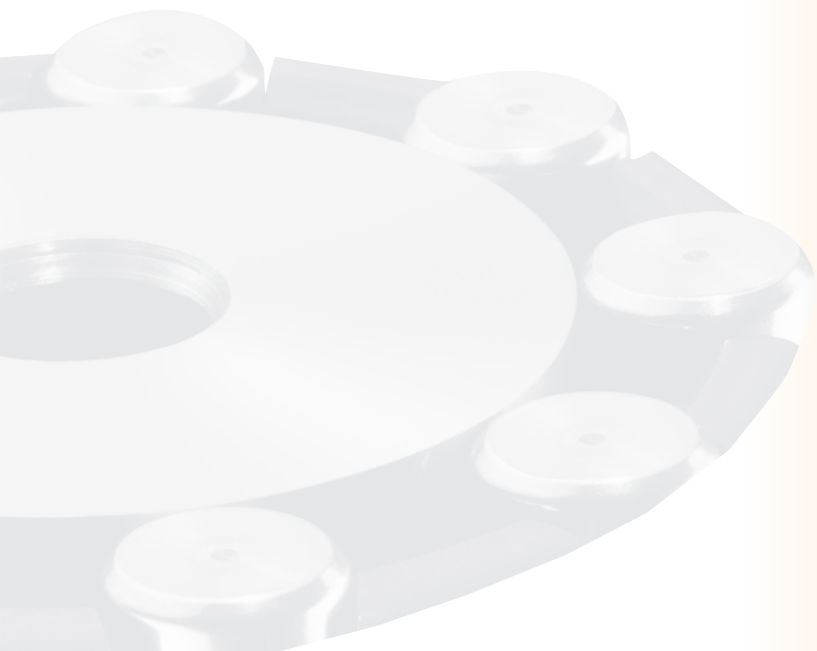
In addition to Roll-a-Finish tools for IDs, ODs, and special part configurations, Cogsdill offers several other burnishing products and related items, including:

- *Bearingizing Tools*, for burnishing IDs in parts with thin walls or irregular wall thicknesses, or in applications where porosity retention or extremely close tolerances are required
- *CX® External Roller Burnishing Machines*, for sizing, finishing, and work-hardening cylindrical surfaces of any length
- *Diamond Burnishing Tools*, for generating mirror finishes on ODs, large IDs, or faces of virtually any diameter
- *Universal Burnishing Tools*, for burnishing ODs, large IDs, faces, tapers, contours, and irregular surfaces with a single roll

MRBT
Micro Roller Burnishing Tools

universal
burnishing
tools

bearingizing
tools



SR Series

Internal Roll-a-Finish® tools

Our premier line of internal Roll-a-Finish® tools, designed to suit all applications. Ideal for applications where tool length is restricted by tool changers, turrets, etc.

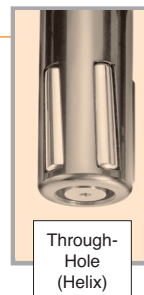


Offered in *three styles*:

- Through-hole style with no-helix cage (machine-feeding)
- Through-hole style with helix cage (self-feeding)
- Bottoming-style for blind hole, with no-helix cage (machine-feeding)



Through-Hole (No Helix)



Through-Hole (Helix)



Bottoming (No Helix)

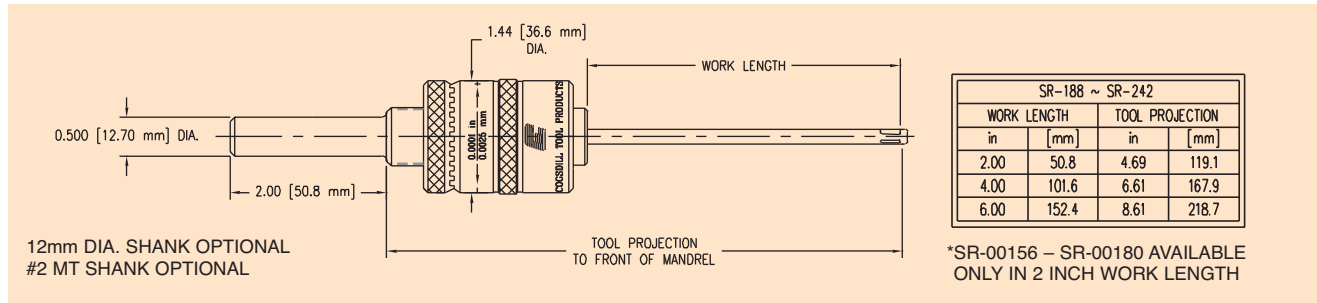
... with up to *four work lengths*:

- Two inch (SR)
- Four inch (SR-4)
- Six inch (SR-6)
- Eight inch (SR-8)

... and *available from stock*:

- for hole sizes from .156 to 2.500 inches (3.96 to 63.5mm).
- Tools are adjustable in increments of .0001 inch (.002mm).

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 5/32 TO 1/4 IN. (3.96 TO 6.35mm)
All tool numbers shown are machine fed tools. For self-feeding (helical) tools, see notes below.

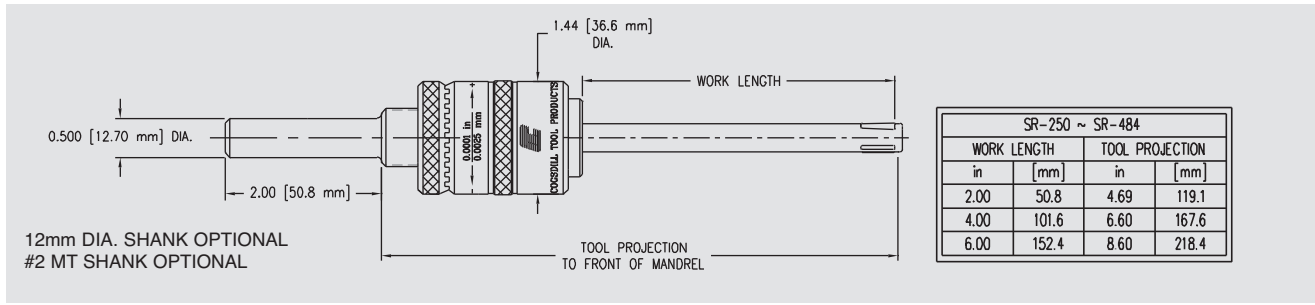
Note: Tool #'s SR-00180 & below available only in 2.00 inch work length, and machine fed design.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.156-.163	3.96-4.14	SR-00156	RR-00229-D14 3 REQUIRED PER SET	SR-00156-D11	SR-00156-D13
.164-.171	4.16-4.34	SR-00164		SR-00164-D11	SR-00164-D13
.172-.179	4.37-4.54	SR-00172		SR-00172-D11	SR-00172-D13
.180-.187	4.57-4.75	SR-00180		SR-00180-D11	SR-00180-D13
.187-.195	4.75-4.95	SR-00188	SR-00187-D14 3 REQUIRED PER SET	SR-00188-D11	SR-00188-D13
		SR-00188-4		SR-00188-4-D11	SR-00188-4-D13
		SR-00188-6		SR-00188-6-D11	SR-00188-6-D13
.194-.202	4.93-5.13	SR-00195		SR-00195-D11	SR-00195-D13
		SR-00195-4		SR-00195-4-D11	SR-00195-4-D13
		SR-00195-6		SR-00195-6-D11	SR-00195-6-D13
.202-.210	5.13-5.33	SR-00203		SR-00203-D11	SR-00203-D13
		SR-00203-4		SR-00203-4-D11	SR-00203-4-D13
		SR-00203-6		SR-00203-6-D11	SR-00203-6-D13
.210-.218	5.33-5.54	SR-00211		SR-00211-D11	SR-00211-D13
		SR-00211-4		SR-00211-4-D11	SR-00211-4-D13
		SR-00211-6		SR-00211-6-D11	SR-00211-6-D13
.218-.226	5.54-5.74	SR-00219	SR-00219-D11	SR-00219-D13	
		SR-00219-4	SR-00219-4-D11	SR-00219-4-D13	
		SR-00219-6	SR-00219-6-D11	SR-00219-6-D13	
.225-.233	5.72-5.92	SR-00226	SR-00226-D11	SR-00226-D13	
		SR-00226-4	SR-00226-4-D11	SR-00226-4-D13	
		SR-00226-6	SR-00226-6-D11	SR-00226-6-D13	
.233-.241	5.92-6.12	SR-00234	SR-00234-D11	SR-00234-D13	
		SR-00234-4	SR-00234-4-D11	SR-00234-4-D13	
		SR-00234-6	SR-00234-6-D11	SR-00234-6-D13	
.241-.249	6.12-6.32	SR-00242	SR-00242-D11	SR-00242-D13	
		SR-00242-4	SR-00242-4-D11	SR-00242-4-D13	
		SR-00242-6	SR-00242-6-D11	SR-00242-6-D13	

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel & cage (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as "SRH". Bottoming (blind bore) tools are not available in these sizes.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 1/4 TO 3/8 IN. (6.35 TO 9.52mm)

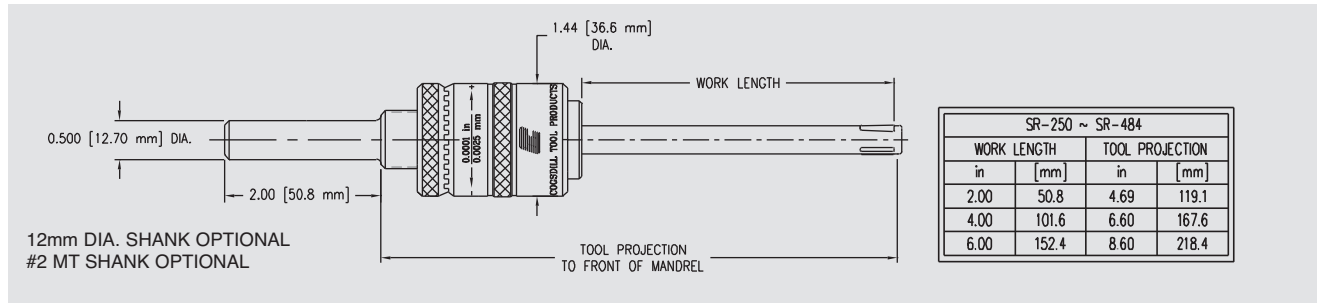
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.246-.267	6.25-6.78	SR-00250	SR-00250-D14 5 REQUIRED PER SET	SR-00250-D11	SR-00250-D13
		SR-00250-4		SR-00250-4-D11	SR-00250-4-D13
		SR-00250-6		SR-00250-6-D11	SR-00250-6-D13
.262-.283	6.65-7.19	SR-00266		SR-00266-D11	SR-00266-D13
		SR-00266-4		SR-00266-4-D11	SR-00266-4-D13
		SR-00266-6		SR-00266-6-D11	SR-00266-6-D13
.277-.298	7.04-7.57	SR-00281		SR-00281-D11	SR-00281-D13
		SR-00281-4		SR-00281-4-D11	SR-00281-4-D13
		SR-00281-6		SR-00281-6-D11	SR-00281-6-D13
.293-.314	7.44-7.98	SR-00297		SR-00297-D11	SR-00297-D13
		SR-00297-4		SR-00297-4-D11	SR-00297-4-D13
		SR-00297-6		SR-00297-6-D11	SR-00297-6-D13
.308-.329	7.82-8.36	SR-00312	SR-00312-D11	SR-00312-D13	
		SR-00312-4	SR-00312-4-D11	SR-00312-4-D13	
		SR-00312-6	SR-00312-6-D11	SR-00312-6-D13	
.324-.345	8.23-8.76	SR-00328	SR-00328-D11	SR-00328-D13	
		SR-00328-4	SR-00328-4-D11	SR-00328-4-D13	
		SR-00328-6	SR-00328-6-D11	SR-00328-6-D13	
.340-.361	8.64-9.17	SR-00344	SR-00344/375-D11	SR-00344-D13	
		SR-00344-4	SR-00344/375-4-D11	SR-00344-4-D13	
		SR-00344-6	SR-00344/375-6-D11	SR-00344-6-D13	
.355-.376	9.02-9.55	SR-00359	SR-00359/391-D11	SR-00359-D13	
		SR-00359-4	SR-00359/391-4-D11	SR-00359-4-D13	
		SR-00359-6	SR-00359/391-6-D11	SR-00359-6-D13	

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel & cage (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 3/8 TO 1/2 IN. (9.52 TO 12.70mm)

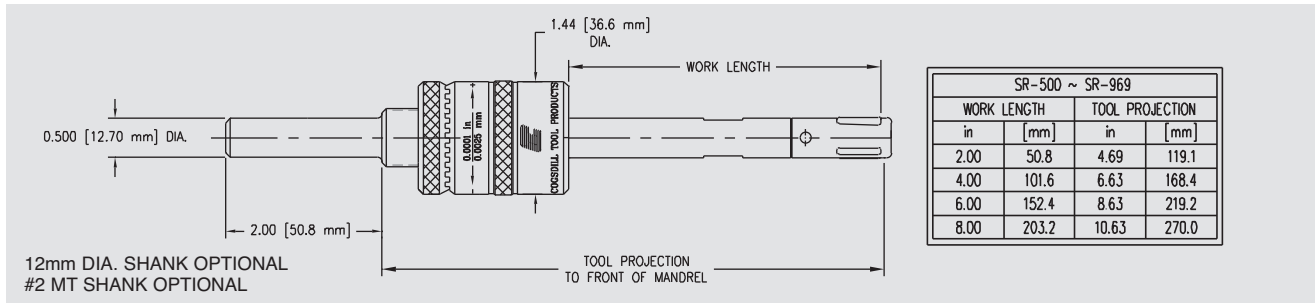
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.371-.392	9.42-9.96	SR-00375	SR-00375-D14	SR-00344/375-D11	SR-00375-D13
		SR-00375-4		SR-00344/375-4-D11	SR-00375-4-D13
		SR-00375-6		SR-00344/375-6-D11	SR-00375-6-D13
.387-.408	9.83-10.36	SR-00391	5 REQUIRED PER SET	SR-00359/391-D11	SR-00391-D13
		SR-00391-4		SR-00359/391-4-D11	SR-00391-4-D13
		SR-00391-6		SR-00359/391-6-D11	SR-00391-6-D13
.402-.423	10.21-10.74	SR-00406	SR-00438-D14	SR-00406-D11	SR-00406-D13
		SR-00406-4		SR-00406-4-D11	SR-00406-4-D13
		SR-00406-6		SR-00406-6-D11	SR-00406-6-D13
.418-.439	10.62-11.15	SR-00422	5 REQUIRED PER SET	SR-00422-D11	SR-00422-D13
		SR-00422-4		SR-00422-4-D11	SR-00422-4-D13
		SR-00422-6		SR-00422-6-D11	SR-00422-6-D13
.434-.455	11.02-11.56	SR-00438	5 REQUIRED PER SET	SR-00438-D11	SR-00438-D13
		SR-00438-4		SR-00438-4-D11	SR-00438-4-D13
		SR-00438-6		SR-00438-6-D11	SR-00438-6-D13
.449-.470	11.40-11.94	SR-00453	5 REQUIRED PER SET	SR-00453-D11	SR-00453-D13
		SR-00453-4		SR-00453-4-D11	SR-00453-4-D13
		SR-00453-6		SR-00453-6-D11	SR-00453-6-D13
.465-.486	11.81-12.34	SR-00469	5 REQUIRED PER SET	SR-00469-D11	SR-00469-D13
		SR-00469-4		SR-00469-4-D11	SR-00469-4-D13
		SR-00469-6		SR-00469-6-D11	SR-00469-6-D13
.480-.501	12.19-12.73	SR-00484	5 REQUIRED PER SET	SR-00484-D11	SR-00484-D13
		SR-00484-4		SR-00484-4-D11	SR-00484-4-D13
		SR-00484-6		SR-00484-6-D11	SR-00484-6-D13

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel & cage (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 1/2 TO 3/4 IN. (12.70 TO 19.05mm)

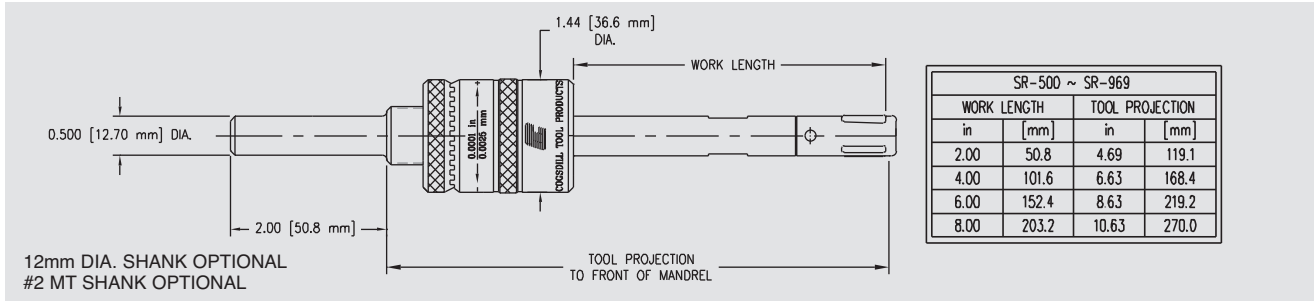
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.496-.537	12.60-13.64	SR-00500	SR-00500-D14 5 REQUIRED PER SET	SR-00500-D11	SR-00500-D13
		SR-00500-4		SR-00500-4-D11	
		SR-00500-6		SR-00500-6-D11	
		SR-00500-8		SR-00500-8-D11	
.527-.568	13.39-14.43	SR-00531		SR-00531-D11	SR-00531-D13
		SR-00531-4		SR-00531-4-D11	
		SR-00531-6		SR-00531-6-D11	
		SR-00531-8		SR-00531-8-D11	
.558-.599	14.17-15.21	SR-00562		SR-00562-D11	SR-00562-D13
		SR-00562-4		SR-00562-4-D11	
		SR-00562-6	SR-00562-6-D11		
		SR-00562-8	SR-00562-8-D11		
.590-.631	14.99-16.03	SR-00594	SR-00594-D11	SR-00594-D13	
		SR-00594-4	SR-00594-4-D11		
		SR-00594-6	SR-00594-6-D11		
		SR-00594-8	SR-00594-8-D11		
.621-.662	15.77-16.81	SR-00625	SR-00625-D11	SR-00625-D13	
		SR-00625-4	SR-00625-4-D11		
		SR-00625-6	SR-00625-6-D11		
		SR-00625-8	SR-00625-8-D11		
.652-.693	16.56-17.60	SR-00656	SR-00656-D11	SR-00656-D13	
		SR-00656-4	SR-00656-4-D11		
		SR-00656-6	SR-00656-6-D11		
		SR-00656-8	SR-00656-8-D11		
.684-.725	17.37-18.42	SR-00688	SR-00688-D11	SR-00688-D13	
		SR-00688-4	SR-00688-4-D11		
		SR-00688-6	SR-00688-6-D11		
		SR-00688-8	SR-00688-8-D11		
.715-.756	18.16-19.20	SR-00719	SR-00719-D11	SR-00719-D13	
		SR-00719-4	SR-00719-4-D11		
		SR-00719-6	SR-00719-6-D11		
		SR-00719-8	SR-00719-8-D11		

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel & cage (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 3/4 TO 1 IN. (19.05 TO 25.40mm)

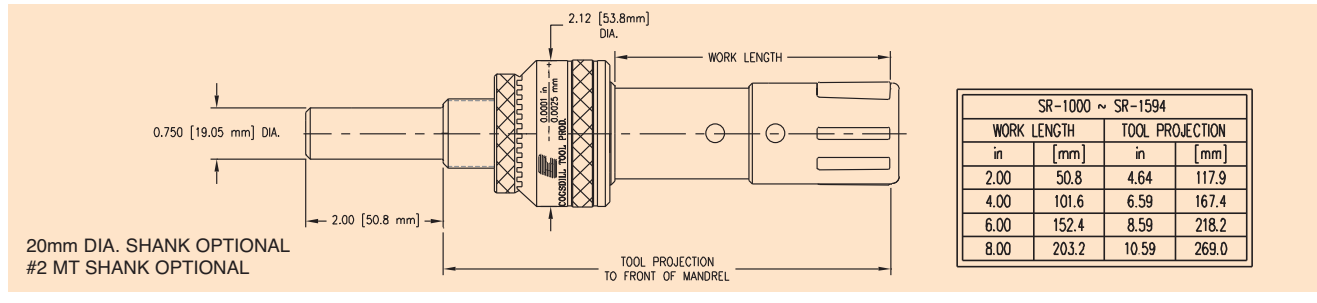
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.746-.787	18.95-19.99	SR-00750	SR-00750-D14 5 REQUIRED PER SET	SR-00750-D11	SR-00750-D13
		SR-00750-4		SR-00750-4-D11	
		SR-00750-6		SR-00750-6-D11	
		SR-00750-8		SR-00750-8-D11	
.777-.818	19.74-20.78	SR-00781		SR-00781-D11	SR-00781-D13
		SR-00781-4		SR-00781-4-D11	
		SR-00781-6		SR-00781-6-D11	
		SR-00781-8		SR-00781-8-D11	
.808-.849	20.52-21.56	SR-00812		SR-00812-D11	SR-00812-D13
		SR-00812-4		SR-00812-4-D11	
		SR-00812-6		SR-00812-6-D11	
		SR-00812-8		SR-00812-8-D11	
.840-.881	21.34-22.38	SR-00844	SR-00844-D11	SR-00844-D13	
		SR-00844-4	SR-00844-4-D11		
		SR-00844-6	SR-00844-6-D11		
		SR-00844-8	SR-00844-8-D11		
.871-.912	22.12-23.16	SR-00875	SR-00875-D11	SR-00875-D13	
		SR-00875-4	SR-00875-4-D11		
		SR-00875-6	SR-00875-6-D11		
		SR-00875-8	SR-00875-8-D11		
.902-.943	22.91-23.95	SR-00906	SR-00906-D11	SR-00906-D13	
		SR-00906-4	SR-00906-4-D11		
		SR-00906-6	SR-00906-6-D11		
		SR-00906-8	SR-00906-8-D11		
.934-.975	23.72-24.77	SR-00938	SR-00938-D11	SR-00938-D13	
		SR-00938-4	SR-00938-4-D11		
		SR-00938-6	SR-00938-6-D11		
		SR-00938-8	SR-00938-8-D11		
.965-1.006	24.51-25.55	SR-00969	SR-00969-D11	SR-00969-D13	
		SR-00969-4	SR-00969-4-D11		
		SR-00969-6	SR-00969-6-D11		
		SR-00969-8	SR-00969-8-D11		

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 1 TO 1-5/16 IN. (25.4 TO 33.34mm)

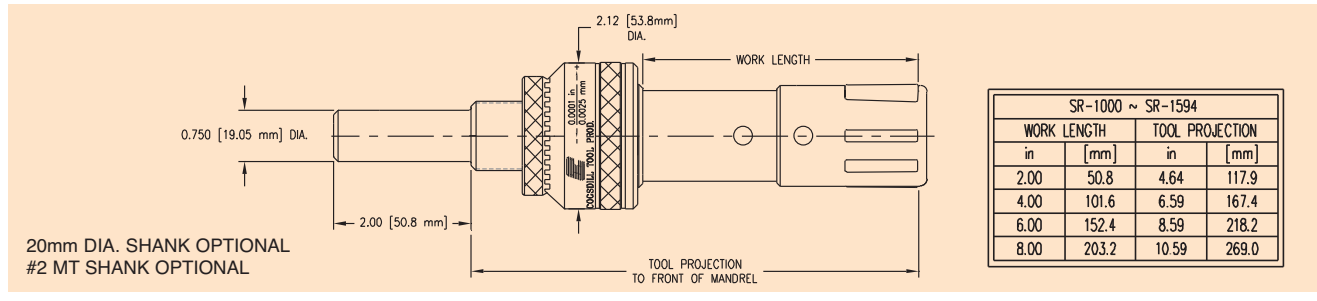
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
.996-1.037	25.30-26.34	SR-01000	SR-00875-D14 7 REQUIRED PER SET	R-01000-D11	SR-01000-D13
		SR-01000-4			
		SR-01000-6			
		SR-01000-8			
1.027-1.068	26.09-27.13	SR-01031		R-01031-D11	SR-01031-D13
		SR-01031-4			
		SR-01031-6			
		SR-01031-8			
1.058-1.099	26.87-27.91	SR-01062		R-01062-D11	SR-01062-D13
		SR-01062-4			
		SR-01062-6			
		SR-01062-8			
1.090-1.131	27.69-28.73	SR-01094		R-01094/1188-D11	SR-01094-D13
		SR-01094-4			
		SR-01094-6			
		SR-01094-8			
1.121-1.162	28.47-29.51	SR-01125	R-01031/1125-D11	SR-01125-D13	
		SR-01125-4			
		SR-01125-6			
		SR-01125-8			
1.152-1.193	29.26-30.30	SR-01156	R-01062/1156-D11	SR-01156-D13	
		SR-01156-4			
		SR-01156-6			
		SR-01156-8			
1.184-1.225	30.07-31.12	SR-01188	R-01094/1188-D11	SR-01188-D13	
		SR-01188-4			
		SR-01188-6			
		SR-01188-8			
1.215-1.256	30.86-31.90	SR-01219	R-01219-D11	SR-01219-D13	
		SR-01219-4			
		SR-01219-6			
		SR-01219-8			
1.246-1.287	31.65-32.69	SR-01250	R-01250-D11	SR-01250-D13	
		SR-01250-4			
		SR-01250-6			
		SR-01250-8			
1.277-1.318	32.44-33.48	SR-01281	R-01281-D11	SR-01281-D13	
		SR-01281-4			
		SR-01281-6			
		SR-01281-8			

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



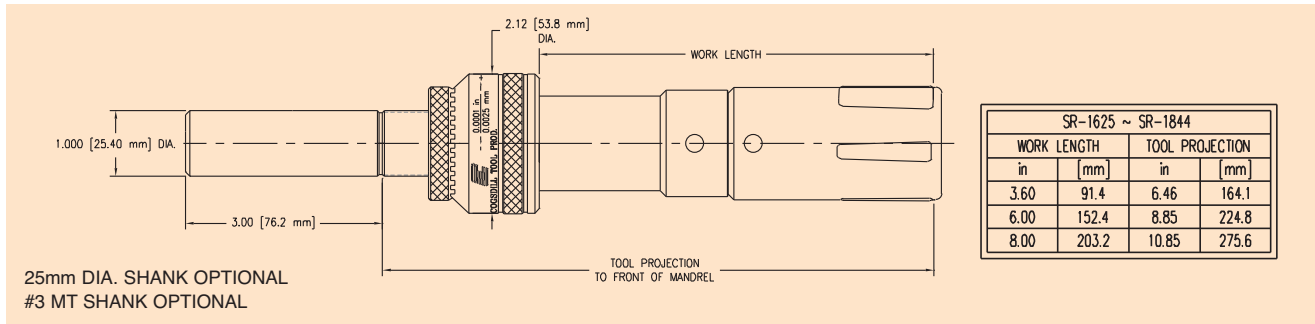
“SR” SERIES ROLL-A-FINISH® TOOLS 1-5/16 TO 1-5/8 IN. (33.24 TO 41.28mm)
 All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM		ROLL	MANDREL	CAGE
1.308-1.349	33.22-34.26	SR-01312	SR-01125-D14 7 REQUIRED PER SET	R-01312-D11	SR-01312-D13
		SR-01312-4			
		SR-01312-6			
		SR-01312-8			
1.340-1.381	34.04-35.08	SR-01344		R-01344-D11	SR-01344-D13
		SR-01344-4			
		SR-01344-6			
		SR-01344-8			
1.371-1.412	34.82-35.86	SR-01375		R-01375-D11	SR-01375-D13
		SR-01375-4			
		SR-01375-6			
1.402-1.443	35.61-36.65	SR-01406		R-01406-D11	SR-01406-D13
		SR-01406-4			
		SR-01406-6			
1.434-1.475	36.42-37.47	SR-01438	R-01438-D11	SR-01438-D13	
		SR-01438-4			
		SR-01438-6			
1.465-1.506	37.21-38.25	SR-01469	R-01469-D11	SR-01469-D13	
		SR-01469-4			
		SR-01469-6			
1.496-1.537	38.00-39.04	SR-01500	R-01500-D11	SR-01500-D13	
		SR-01500-4			
		SR-01500-6			
1.527-1.568	38.79-39.83	SR-01531	R-01531-D11	SR-01531-D13	
		SR-01531-4			
		SR-01531-6			
1.558-1.599	39.57-40.61	SR-01562	R-01562-D11	SR-01562-D13	
		SR-01562-4			
		SR-01562-6			
1.590-1.631	40.39-41.43	SR-01594	R-01594-D11	SR-01594-D13	
		SR-01594-4			
		SR-01594-6			

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 1-5/8 TO 1-7/8 IN (41.28 TO 47.63mm)

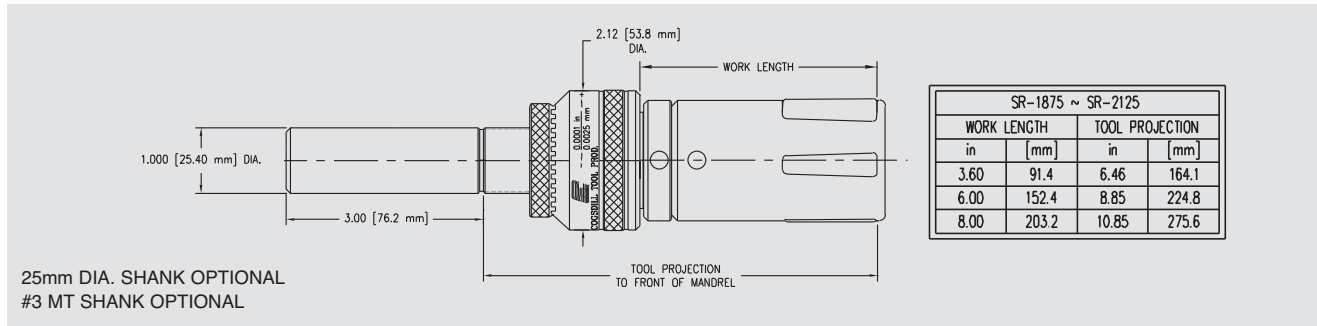
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
1.621-1.662	41.17-42.21	SR-01625	SR-01625-D14 7 REQUIRED PER SET	R-01625-D11	SR-01625-D13
		SR-01625-6			
		SR-01625-8			
1.652-1.693	41.96-43.00	SR-01656		R-01656-D11	SR-01656-D13
		SR-01656-6			
		SR-01656-8			
1.684-1.725	42.77-43.82	SR-01688		R-01688-D11	SR-01688-D13
		SR-01688-6			
		SR-01688-8			
1.715-1.756	43.56-44.60	SR-01719		R-01719-D11	SR-01719-D13
		SR-01719-6			
		SR-01719-8			
1.746-1.787	44.35-45.39	SR-01750	R-01750-D11	SR-01750-D13	
		SR-01750-6			
		SR-01750-8			
1.777-1.818	45.14-46.18	SR-01781	R-01781-D11	SR-01781-D13	
		SR-01781-6			
		SR-01781-8			
1.808-1.849	45.92-46.96	SR-01812	R-01812-D11	SR-01812-D13	
		SR-01812-6			
		SR-01812-8			
1.840-1.881	46.74-47.78	SR-01844	R-01844-D11	SR-01844-D13	
		SR-01844-6			
		SR-01844-8			

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 1-7/8 TO 2-5/32 IN. (47.63 TO 54.76mm)

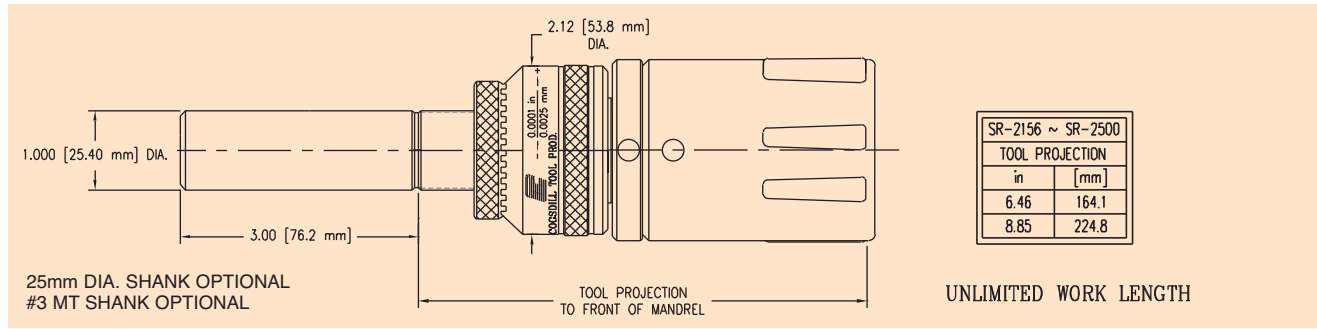
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
1.871-1.912	47.52-48.56	SR-01875	SR-01625-D14 7 REQUIRED PER SET	R-01875-D11	SR-01875-D13
		SR-01875-6			
		SR-01875-8			
1.902-1.943	48.31-49.35	SR-01906		R-01906-D11	SR-01906-D13
		SR-01906-6			
		SR-01906-8			
1.934-1.975	49.12-50.17	SR-01938		R-01938-D11	SR-01938-D13
		SR-01938-6			
		SR-01938-8			
1.965-2.006	49.91-50.95	SR-01969		R-01969-D11	SR-01969-D13
		SR-01969-6			
		SR-01969-8			
1.996-2.037	50.70-51.74	SR-02000		R-02000-D11	SR-02000-D13
		SR-02000-6			
		SR-02000-8			
2.027-2.068	51.49-52.53	SR-02031	R-02031-D11	SR-02031-D13	
		SR-02031-6			
		SR-02031-8			
2.058-2.099	52.27-53.31	SR-02062	R-02062-D11	SR-02062-D13	
		SR-02062-6			
		SR-02062-8			
2.090-2.131	53.09-54.13	SR-02094	R-02094-D11	SR-02094-D13	
		SR-02094-6			
		SR-02094-8			
2.121-2.162	53.87-54.91	SR-02125	R-02125-D11	SR-02125-D13	
		SR-02125-6			
		SR-02125-8			

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Standard tool specifications



“SR” SERIES ROLL-A-FINISH® TOOLS 2-5/32 to 2-1/2 in. (54.76 to 63.5mm)

All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
2.152-2.193	54.66-55.70	SR-02156 SR-02156-8	SR-01625-D14 5 REQUIRED PER SET	R-02156-D11	SR-02156-D13
2.184-2.225	55.47-56.52	SR-02188 SR-02188-8		R-02188-D11	SR-02188-D13
2.215-2.256	56.26-57.30	SR-02219 SR-02219-8		R-02219-D11	SR-02219-D13
2.246-2.287	57.05-58.09	SR-02250 SR-02250-8		R-02250-D11	SR-02250-D13
2.277-2.318	57.84-58.88	SR-02281 SR-02281-8		R-02281-D11	SR-02281-D13
2.308-2.349	58.62-59.66	SR-02312 SR-02312-8		R-02312-D11	SR-02312-D11
2.340-2.381	59.44-60.48	SR-02344 SR-02344-8		R-02344-D11	SR-02344-D11
2.371-2.412	60.22-61.26	SR-02375 SR-02375-8	SR-01625-D14 9 REQUIRED PER SET	R-02375-D11	SR-02375-D11
2.402-2.443	61.01-62.05	SR-02406 SR-02406-8		R-02406-D11	SR-02406-D13
2.434-2.475	61.82-62.87	SR-02438 SR-02438-8		R-02438-D11	SR-02438-D13
2.465-2.506	62.61-63.65	SR-02469 SR-02469-8		R-02469-D11	SR-02469-D13
2.496-2.537	63.40-64.44	SR-02500 SR-02500-8		R-02500-D11	SR-02500-D13

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “SRH”. For bottoming (blind bore) tools, designate tool number as “SRB”.

Internal Roll-a-Finish® tools

U series

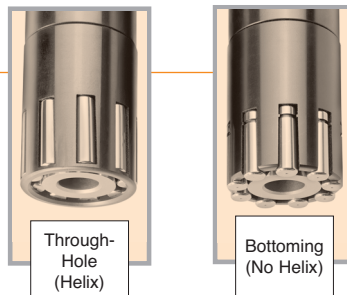
For hole diameters from 2.500 to 4.000 inches (63.5 to 101.6mm).

*Work length is unlimited;
extension adapters can be used to
increase work length.*



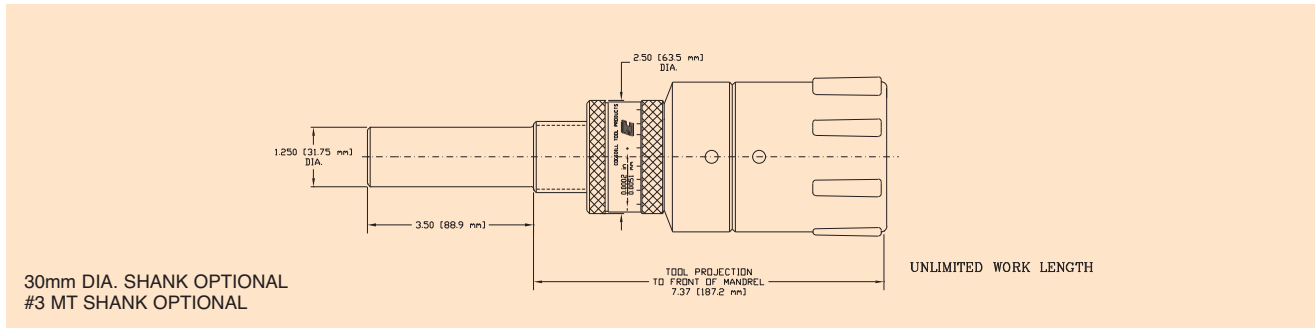
Offered in *two styles*:

- Through-hole style machine fed cage or with optional self-feeding (helical) cage. (Tool # designated as UH for self-feeding)
- Bottoming-style for blind hole, with no-helix cage (machine-feeding)



... and available from stock.

Standard tool specifications



“U” SERIES ROLL-A-FINISH® TOOLS 2-17/32 TO 3-1/4 IN. (64.3 TO 82.55 MM)

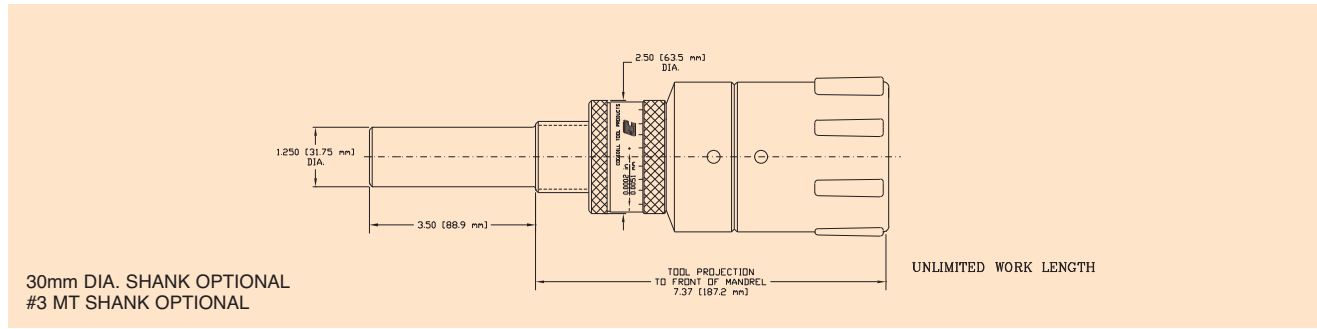
All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
2.527-2.568	64.19-65.23	U-02531	SR-02531-D14 9 REQUIRED PER SET	R-02531-D11	SR-02531-D13
2.558-2.599	64.97-66.01	U-02562		R-02562-D11	SR-02562-D13
2.590-2.631	65.79-66.83	U-02594		R-02594-D11	SR-02594-D13
2.621-2.662	66.57-67.61	U-02625		R-02625-D11	SR-02625-D13
2.652-2.693	67.36-68.40	U-02656		R-02656-D11	SR-02656-D13
2.684-2.725	68.17-69.22	U-02688		R-02688-D11	SR-02688-D13
2.715-2.756	68.96-70.00	U-02719		R-02719-D11	SR-02719-D13
2.746-2.787	69.75-70.79	U-02750		R-02750-D11	SR-02750-D13
2.777-2.818	70.54-71.58	U-02781		R-02781-D11	SR-02781-D13
2.808-2.849	71.32-72.36	U-02812		R-02812-D11	SR-02812-D13
2.840-2.881	72.14-73.18	U-02844		R-02844-D11	SR-02844-D13
2.871-2.912	72.92-73.96	U-02875		R-02875-D11	SR-02875-D13
2.902-2.943	73.71-74.75	U-02906		R-02906-D11	SR-02906-D13
2.934-2.975	74.52-75.57	U-02938		R-02938-D11	SR-02938-D13
2.965-3.006	75.31-76.35	U-02969	R-02969-D11	SR-02969-D13	
2.996-3.037	76.10-77.14	U-03000	R-03000-D11	SR-03000-D13	
3.027-3.068	76.89-77.93	U-03031	R-03031-D11	SR-03031-D13	
3.058-3.099	77.67-78.71	U-03062	R-03062-D11	SR-03062-D13	
3.090-3.131	78.49-79.53	U-03094	R-03094-D11	SR-03094-D13	
3.121-3.162	79.27-80.31	U-03125	R-03125-D11	SR-03125-D13	
3.152-3.193	80.06-81.10	U-03156	R-03156-D11	SR-03156-D13	
3.184-3.225	80.87-81.92	U-03188	R-03188-D11	SR-03188-D13	
3.215-3.256	81.66-82.70	U-03219	R-03219-D11	SR-03219-D13	
3.246-3.287	82.45-83.49	U-03250	R-03250-D11	SR-03250-D13	

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “UH”. For bottoming (blind bore) tools, designate tool number as “UB”. Self-feeding cages designate as “R” and bottoming as “SRB”.

Standard tool specifications



“U” SERIES ROLL-A-FINISH® TOOLS 3-9/32 TO 4 IN. (83.24 TO 101.6 MM)

All tool numbers shown are machine fed tools. For self-feeding (helical) and bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	MANDREL	CAGE
3.277-3.318	83.24-84.28	U-03281	SR-05000-D14 9 REQUIRED PER SET	R-03281-D11	SR-03281-D13
3.308-3.349	84.02-85.06	U-03312		R-03312-D11	SR-03312-D13
3.340-3.381	84.84-85.88	U-03344		R-03344-D11	SR-03344-D13
3.371-3.412	85.62-86.66	U-03375		R-03375-D11	SR-03375-D13
3.402-3.443	86.41-87.45	U-03406		R-03406-D11	SR-03406-D13
3.434-3.475	87.22-88.27	U-03438		R-03438-D11	SR-03438-D13
3.465-3.506	88.01-89.05	U-03469		R-03469-D11	SR-03469-D13
3.496-3.537	88.80-89.84	U-03500		R-03500-D11	SR-03500-D13
3.527-3.568	89.59-90.63	U-03531		R-03531-D11	SR-03531-D13
3.558-3.599	90.37-91.41	U-03562		R-03562-D11	SR-03562-D13
3.590-3.631	91.19-92.23	U-03594		R-03594-D11	SR-03594-D13
3.621-3.662	91.97-93.01	U-03625		R-03625-D11	SR-03625-D13
3.652-3.693	92.76-93.80	U-03656		R-03656-D11	SR-03656-D13
3.684-3.725	93.57-94.62	U-03688		R-03688-D11	SR-03688-D13
3.715-3.756	94.36-95.40	U-03719		R-03719-D11	SR-03719-D13
3.746-3.787	95.15-96.19	U-03750		R-03750-D11	SR-03750-D13
3.777-3.818	95.94-96.98	U-03781		R-03781-D11	SR-03781-D13
3.808-3.849	96.72-97.76	U-03812	R-03812-D11	SR-03812-D13	
3.840-3.881	97.54-98.58	U-03844	R-03844-D11	SR-03844-D13	
3.871-3.912	98.32-99.36	U-03875	R-03875-D11	SR-03875-D13	
3.902-3.943	99.11-100.15	U-03906	R-03906-D11	SR-03906-D13	
3.934-3.975	99.92-100.97	U-03938	R-03938-D11	SR-03938-D13	
3.965-4.006	100.71-101.75	U-03969	R-03969-D11	SR-03969-D13	
3.996-4.037	101.50-102.54	U-04000	R-04000-D11	SR-04000-D13	

Shanks other than shown above are available upon request. Mandrel Assembly consists of rolls, mandrel, cage & sleeve (Add -MA to tool #).

Note: Tool numbers listed are for non-helical, thru-style, machine fed designs. For self-feeding (helical) tools, designate tool number as “UH”. For bottoming (blind bore) tools, designate tool number as “UB”. Self-feeding cages designate as “R” and bottoming as “SRB”.

External Roll-a-Finish® tools

AEX series

For burnishing the outside diameter of cylindrical parts, such as shafts rotating in bushings or bearings. Provides an ideal surface for grease and oil seals.



AEX-1

Available from stock for nominal diameters from .062 to 2.000 inches (1.57 to 50.8mm)

Offered in three styles:

- **AEX-1**, with a smaller body diameter and shorter overall length suitable for screw machines and automatics. All AEX-1 tools are bottoming-style, designed for machine-feed. Available for nominal diameters from .062 to .625 inch (1.57 to 15.88mm).
- **AEX-2**, for nominal diameters from .062 to 1.000 inch (1.57 to 25.4mm). Features twice the work length as compared to the AEX-1. Available with machine-feeding cage or with bottoming-style cage.
- **AEX-3**, for nominal diameters from 1.000 to 2.000 inches (25.4 to 50.8mm). Available with machine-feeding cage or with bottoming-style cage.

AEX tools are adjustable in increments of .0001 inch (.002mm).

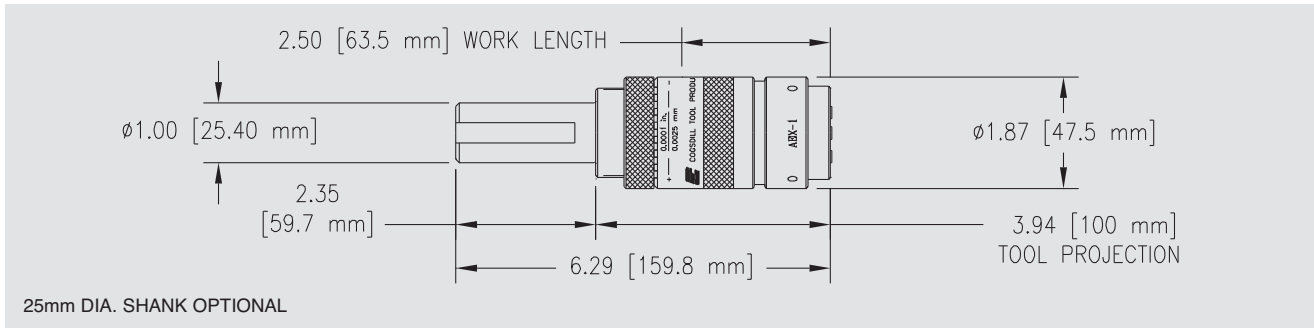


AEX-2



AEX-3

Standard tool specifications

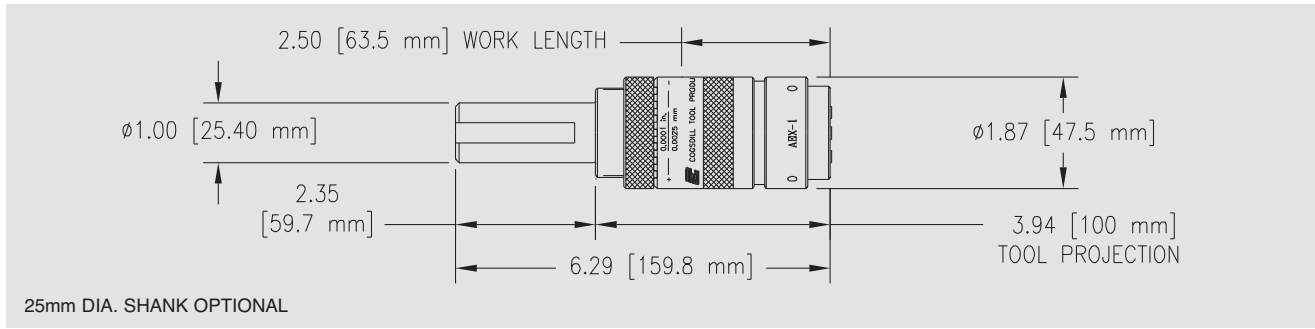


“AEX-1” SERIES ROLL-A-FINISH® TOOLS 1/16 TO 3/8 IN. (1.57 TO 9.53 MM)
All AEX-1 tools are machine fed tools and of the bottoming design only.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
.043-.064	1.09-1.63	AEX-1-00062	RB-00500-D14 3 REQUIRED PER SET	AEX-00062-D08	AEX-00062-D06
.059-.080	1.50-2.03	AEX-1-00078		AEX-00078-D08	AEX-00078-D06
.075-.096	1.91-2.44	AEX-1-00094		AEX-00094-D08	AEX-00094-D06
.090-.111	2.29-2.82	AEX-1-00109		AEX-00109-D08	AEX-00109-D06
.106-.127	2.69-3.23	AEX-1-00125		AEX-00125-D08	AEX-00125-D06
.122-.143	3.10-3.63	AEX-1-00141		AEX-00141-D08	AEX-00141-D06
.137-.158	3.48-4.01	AEX-1-00156		AEX-00156-D08	AEX-00156-D06
.152-.173	3.86-4.39	AEX-1-00171		AEX-00171-D08	AEX-00171-D06
.168-.189	4.27-4.80	AEX-1-00187		AEX-00187-D08	AEX-00187-D06
.184-.205	4.67-5.21	AEX-1-00203		AEX-00203-D08	AEX-00203-D06
.200-.221	5.08-5.61	AEX-1-00219		AEX-00219-D08	AEX-00219-D06
.215-.236	5.46-5.99	AEX-1-00234		AEX-00234-D08	AEX-00234-D06
.231-.252	5.87-6.40	AEX-1-00250		AEX-00250-D08	AEX-00250-D06
.247-.268	6.27-6.81	AEX-1-00266	AEX-00266-D08	AEX-00266-D06	
.262-.283	6.65-7.19	AEX-1-00281	AEX-00281-D08	AEX-00281-D06	
.278-.299	7.06-7.59	AEX-1-00297	AEX-00297-D08	AEX-00297-D06	
.293-.314	7.44-7.98	AEX-1-00312	RB-00500-D14 5 REQUIRED PER SET	AEX-00312-D08	AEX-00312-D06
.309-.330	7.85-8.38	AEX-1-00328	AEX-00328-D08	AEX-00328-D06	
.325-.346	8.26-8.79	AEX-1-00344	AEX-00344-D08	AEX-00344-D06	
.340-.361	8.64-9.17	AEX-1-00359	AEX-00359-D08	AEX-00359-D06	
.356-.377	9.04-9.58	AEX-1-00375	AEX-00375-D08	AEX-00375-D06	

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #).

Standard tool specifications



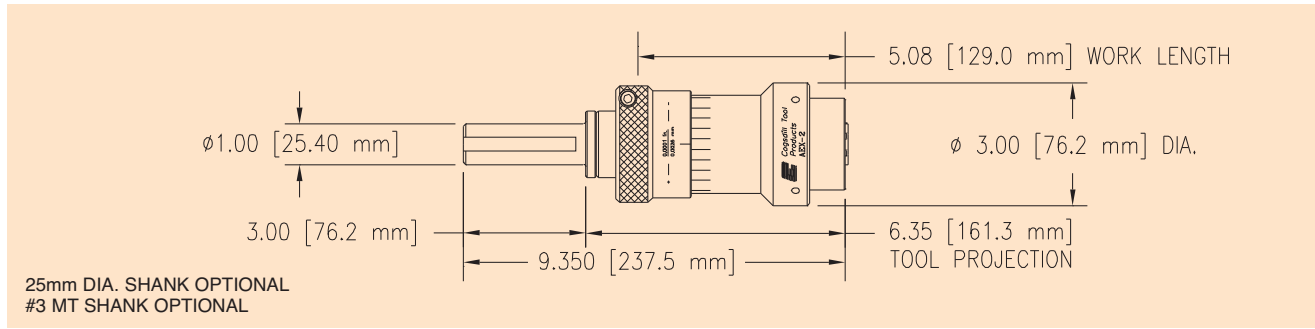
“AEX-1” SERIES ROLL-A-FINISH® TOOLS 3/8 TO 5/8 IN. (9.53 TO 15.88 MM)

All AEX-1 tools are machine fed tools and of the bottoming design only.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
.372-.393	9.49-9.98	AEX-1-00391	RB-00750-D14 5 REQUIRED PER SET	AEX-00391-D08	AEX-00391-D06
.387-.408	9.83-10.36	AEX-1-00406		AEX-00406-D08	AEX-00406-D06
.403-.424	10.24-10.77	AEX-1-00422		AEX-00422-D08	AEX-00422-D06
.418-.439	10.62-11.15	AEX-1-00438		AEX-00438-D08	AEX-00438-D06
.434-.455	11.02-11.56	AEX-1-00453		AEX-00453-D08	AEX-00453-D06
.450-.471	11.43-11.96	AEX-1-00469		AEX-00469-D08	AEX-00469-D06
.465-.486	11.81-12.34	AEX-1-00484		AEX-00484-D08	AEX-00484-D06
.481-.502	12.22-12.75	AEX-1-00500		AEX-00500-D08	AEX-00500-D06
.497-.518	12.62-13.16	AEX-1-00516		AEX-00516-D08	AEX-00516-D06
.512-.533	13.00-13.54	AEX-1-00531		AEX-00531-D08	AEX-00531-D06
.528-.549	13.41-13.94	AEX-1-00547		AEX-00547-D08	AEX-00547-D06
.543-.564	13.79-14.33	AEX-1-00562		AEX-00562-D08	AEX-00562-D06
.559-.580	14.20-14.73	AEX-1-00578		AEX-00578-D08	AEX-00578-D06
.575-.596	14.61-15.14	AEX-1-00594		AEX-00594-D08	AEX-00594-D06
.590-.611	14.99-15.52	AEX-1-00609		AEX-00609-D08	AEX-00609-D06
.606-.627	15.39-15.93	AEX-1-00625		AEX-00625-D08	AEX-00625-D06

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #).

Standard tool specifications

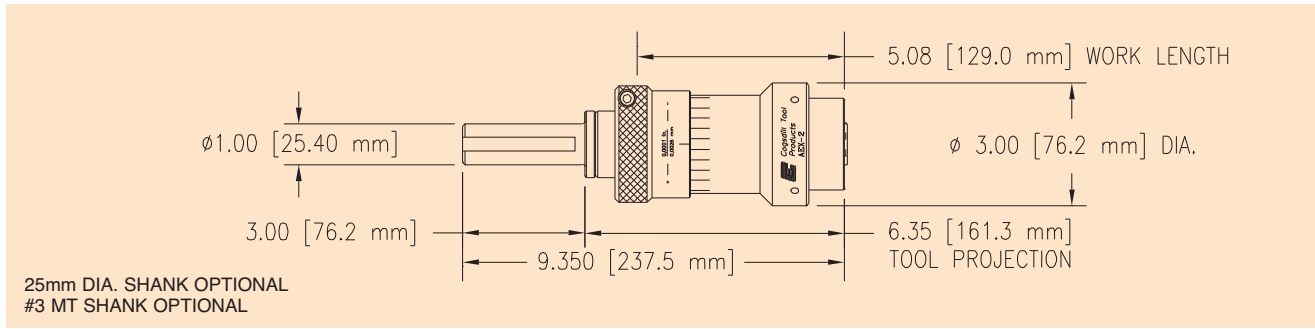


“AEX-2” SERIES ROLL-A-FINISH® TOOLS 1/16 TO 17/32 IN. (1.57 TO 13.5 MM)
All AEX-2 tools are machine fed tools. For bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
.045-.066	1.14-1.68	AEX-2-00062	SR-00500-D14 3 REQUIRED PER SET	CX-1S-00062-D02	NE-00062-D11
.061-.082	1.57-2.08	AEX-2-00078		CX-1S-00078-D02	NE-00078-D11
.077-.098	1.96-2.49	AEX-2-00094		CX-1S-00094-D02	NE-00094-D11
.092-.113	2.34-2.87	AEX-2-00109		CX-1S-00109-D02	NE-00109-D11
.108-.129	2.74-3.28	AEX-2-00125		CX-1S-00125-D02	NE-00125-D11
.124-.145	3.15-3.68	AEX-2-00141		CX-1S-00141-D02	NE-00141-D11
.139-.160	3.53-4.06	AEX-2-00156		CX-1S-00156-D02	NE-00156-D11
.154-.175	3.91-4.45	AEX-2-00171		CX-1S-00171-D02	NE-00171-D11
.170-.191	4.32-4.85	AEX-2-00187		CX-1S-00187-D02	NE-00187-D11
.186-.207	4.72-5.26	AEX-2-00203		CX-1S-00203-D02	NE-00203-D11
.202-.223	5.13-5.66	AEX-2-00219		CX-1S-00219-D02	NE-00219-D11
.217-.238	5.51-6.05	AEX-2-00234		CX-1S-00234-D02	NE-00234-D11
.233-.254	5.92-6.45	AEX-2-00250		SR-00500-D14 5 REQUIRED PER SET	CX-1S-00250-D02
.249-.270	6.32-6.86	AEX-2-00266	CX-1S-00266-D02		NE-00266-D11
.264-.285	6.71-7.24	AEX-2-00281	CX-1S-00281-D02		NE-00281-D11
.280-.301	7.11-7.65	AEX-2-00297	CX-1S-00297-D02		NE-00297-D11
.295-.316	7.49-8.03	AEX-2-00312	CX-1S-00312-D02		NE-00312-D11
.311-.332	7.90-8.43	AEX-2-00328	CX-1S-00328-D02		NE-00328-D11
.327-.348	8.31-8.84	AEX-2-00344	CX-1S-00344-D02		NE-00344-D11
.342-.363	8.69-9.22	AEX-2-00359	SR-00750-D14 5 REQUIRED PER SET	CX-1S-00359-D02	NE-00359-D11
.358-.379	9.09-9.63	AEX-2-00375		CX-1S-00375-D02	NE-00375-D11
.374-.395	9.50-10.03	AEX-2-00391		CX-1S-00391-D02	NE-00391-D11
.389-.410	9.88-10.41	AEX-2-00406		CX-1S-00406-D02	NE-00406-D11
.405-.426	10.29-10.82	AEX-2-00422		CX-1S-00422-D02	NE-00422-D11
.420-.441	10.67-11.20	AEX-2-00438		CX-1S-00438-D02	NE-00438-D11
.436-.457	11.07-11.61	AEX-2-00453		CX-1S-00453-D02	NE-00453-D11
.452-.473	11.48-12.01	AEX-2-00469		CX-1S-00469-D02	NE-00469-D11
.467-.488	11.86-12.40	AEX-2-00484		CX-1S-00484-D02	NE-00484-D11
.483-.504	12.27-12.80	AEX-2-00500		CX-1S-00500-D02	NE-00500-D11
.499-.520	12.67-13.21	AEX-2-00516	CX-1S-00516-D02	NE-00516-D11	
.514-.535	13.06-13.59	AEX-2-00531	CX-1S-00531-D02	NE-00531-D11	

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #).
 For bottoming (blind bore) tools, designate tool number as AEXB and cages as NEB.

Standard tool specifications

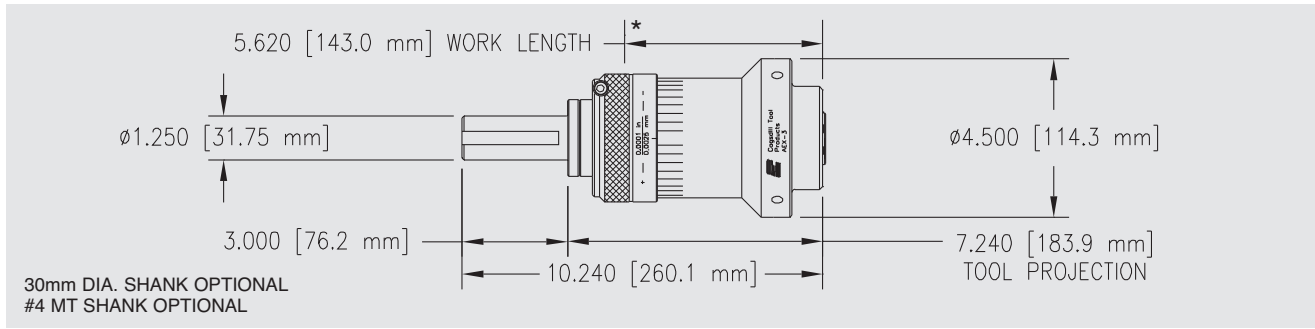


“AEX-2” SERIES ROLL-A-FINISH® TOOLS 17/32 TO 1.000 IN. (13.5 TO 25.4 MM)
All AEX-2 tools are machine fed tools. For bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
.530-.551	13.46-14.00	AEX-2-00547	SR-00750-D14 5 REQUIRED PER SET	CX-1S-00547-D02	NE-00547-D11
.545-.566	13.84-14.38	AEX-2-00562		CX-1S-00562-D02	NE-00562-D11
.561-.582	14.25-14.78	AEX-2-00578		CX-1S-00578-D02	NE-00578-D11
.577-.598	14.66-15.19	AEX-2-00594		CX-1S-00594-D02	NE-00594-D11
.592-.613	15.04-15.57	AEX-2-00609		CX-1S-00609-D02	NE-00609-D11
.608-.629	15.44-15.98	AEX-2-00625		CX-1S-00625-D02	NE-00625-D11
.624-.645	15.85-16.38	AEX-2-00641		CX-1S-00641-D02	NE-00641-D11
.639-.660	16.23-16.76	AEX-2-00656		CX-1S-00656-D02	NE-00656-D11
.655-.676	16.64-17.17	AEX-2-00672		CX-1S-00672-D02	NE-00672-D11
.671-.692	17.04-17.58	AEX-2-00688		CX-1S-00688-D02	NE-00688-D11
.686-.707	17.42-17.96	AEX-2-00703		CX-1S-00703-D02	NE-00703-D11
.702-.723	17.83-18.36	AEX-2-00719		CX-1S-00719-D02	NE-00719-D11
.717-.738	18.21-18.75	AEX-2-00734		CX-1S-00734-D02	NE-00734-D11
.733-.754	18.62-19.15	AEX-2-00750		CX-1S-00750-D02	NE-00750-D11
.749-.770	19.02-19.56	AEX-2-00766		CX-1S-00766-D02	NE-00766-D11
.764-.785	19.41-19.94	AEX-2-00781	CX-1S-00781-D02	NE-00781-D11	
.780-.801	19.81-20.35	AEX-2-00797	CX-1S-00797-D02	NE-00797-D11	
.795-.816	20.19-20.73	AEX-2-00812	CX-1S-00812-D02	NE-00812-D11	
.811-.832	20.60-21.13	AEX-2-00828	CX-1S-00828-D02	NE-00828-D11	
.827-.848	21.00-21.54	AEX-2-00844	CX-1S-00844-D02	NE-00844-D11	
.842-.863	21.39-21.92	AEX-2-00859	CX-1S-00859-D02	NE-00859-D11	
.858-.879	21.79-22.33	AEX-2-00875	CX-1S-00875-D02	NE-00875-D11	
.874-.895	22.20-22.73	AEX-2-00891	CX-1S-00891-D02	NE-00891-D11	
.889-.910	22.58-23.11	AEX-2-00906	CX-1S-00906-D02	NE-00906-D11	
.905-.926	22.99-23.52	AEX-2-00922	CX-1S-00922-D02	NE-00922-D11	
.921-.942	23.39-23.93	AEX-2-00938	CX-1S-00938-D02	NE-00938-D11	
.936-.957	23.77-24.31	AEX-2-00953	CX-1S-00953-D02	NE-00953-D11	
.952-.973	24.18-24.71	AEX-2-00969	CX-1S-00969-D02	NE-00969-D11	
.967-.988	24.56-25.10	AEX-2-00984	CX-1S-00984-D02	NE-00984-D11	
.983-1.004	24.97-25.50	AEX-2-01000	CX-1S-01000-D02	NE-01000-D11	

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #).
 For bottoming (blind bore) tools, designate tool number as AEXB and cages as NEB.

Standard tool specifications

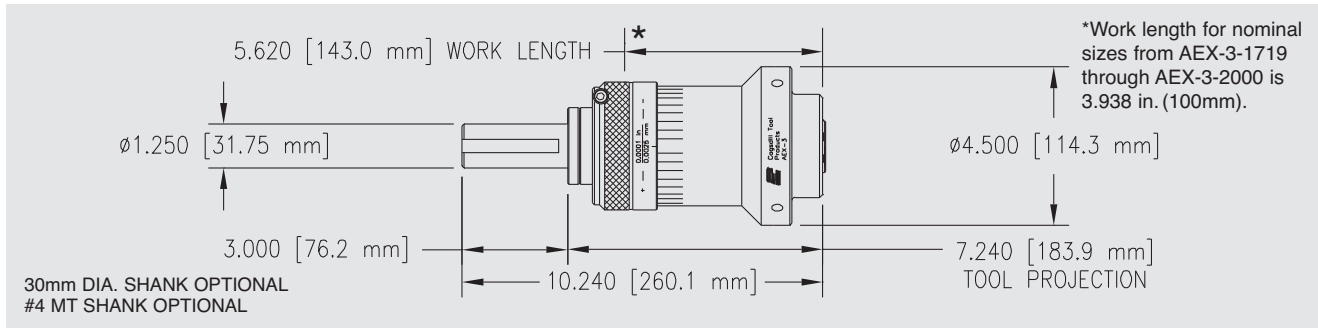


“AEX-3” SERIES ROLL-A-FINISH® TOOLS 1.00 TO 1-13/32 IN. (25.4 TO 35.7 MM)
All AEX-3 tools are machine fed tools. For bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
.999-1.020	25.37-25.91	AEX-3-01016	SR-00875-D14 5 REQUIRED PER SET	AEX-01016-D16	AEX-01016-D14
1.014-1.035	25.76-26.29	AEX-3-01031		AEX-01031-D16	AEX-01031-D14
1.030-1.051	26.16-26.70	AEX-3-01047		AEX-01047-D16	AEX-01047-D14
1.045-1.066	26.54-27.08	AEX-3-01062		AEX-01062-D16	AEX-01062-D14
1.061-1.082	26.95-27.48	AEX-3-01078		AEX-01078-D16	AEX-01078-D14
1.077-1.098	27.36-27.89	AEX-3-01094		AEX-01094-D16	AEX-01094-D14
1.092-1.113	27.74-28.27	AEX-3-01109		AEX-01109-D16	AEX-01109-D14
1.108-1.129	28.14-28.68	AEX-3-01125		AEX-01125-D16	AEX-01125-D14
1.124-1.145	28.55-29.08	AEX-3-01141		AEX-01141-D16	AEX-01141-D14
1.139-1.160	28.93-29.46	AEX-3-01156		AEX-01156-D16	AEX-01156-D14
1.155-1.176	29.34-29.87	AEX-3-01178		AEX-01178-D16	AEX-01178-D14
1.170-1.191	29.72-30.25	AEX-3-01188		AEX-01188-D16	AEX-01188-D14
1.186-1.207	30.12-30.66	AEX-3-01203		AEX-01203-D16	AEX-01203-D14
1.202-1.223	30.53-31.06	AEX-3-01219		AEX-01219-D16	AEX-01219-D14
1.217-1.238	30.91-31.45	AEX-3-01234		AEX-01234-D16	AEX-01234-D14
1.233-1.254	31.32-31.85	AEX-3-01250		AEX-01250-D16	AEX-01250-D14
1.249-1.270	31.72-32.26	AEX-3-01266		AEX-01266-D16	AEX-01266-D14
1.264-1.285	32.11-32.69	AEX-3-01281	AEX-01281-D16	AEX-01281-D14	
1.280-1.301	32.51-33.05	AEX-3-01297	AEX-01297-D16	AEX-01297-D14	
1.295-1.316	32.89-33.43	AEX-3-01312	AEX-01312-D16	AEX-01312-D14	
1.311-1.332	33.30-33.83	AEX-3-01328	AEX-01328-D16	AEX-01328-D14	
1.327-1.348	33.71-34.24	AEX-3-01344	AEX-01344-D16	AEX-01344-D14	
1.342-1.363	34.09-34.62	AEX-3-01359	AEX-01359-D16	AEX-01359-D14	
1.358-1.379	34.49-35.03	AEX-3-01375	AEX-01375-D16	AEX-01375-D14	
1.374-1.395	34.90-35.43	AEX-3-01391	AEX-01391-D16	AEX-01391-D14	
1.389-1.410	35.28-35.81	AEX-3-01406	AEX-01406-D16	AEX-01406-D14	

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #)
 For bottoming (blind bore) tools, designate tool number as AEXB.

Standard tool specifications

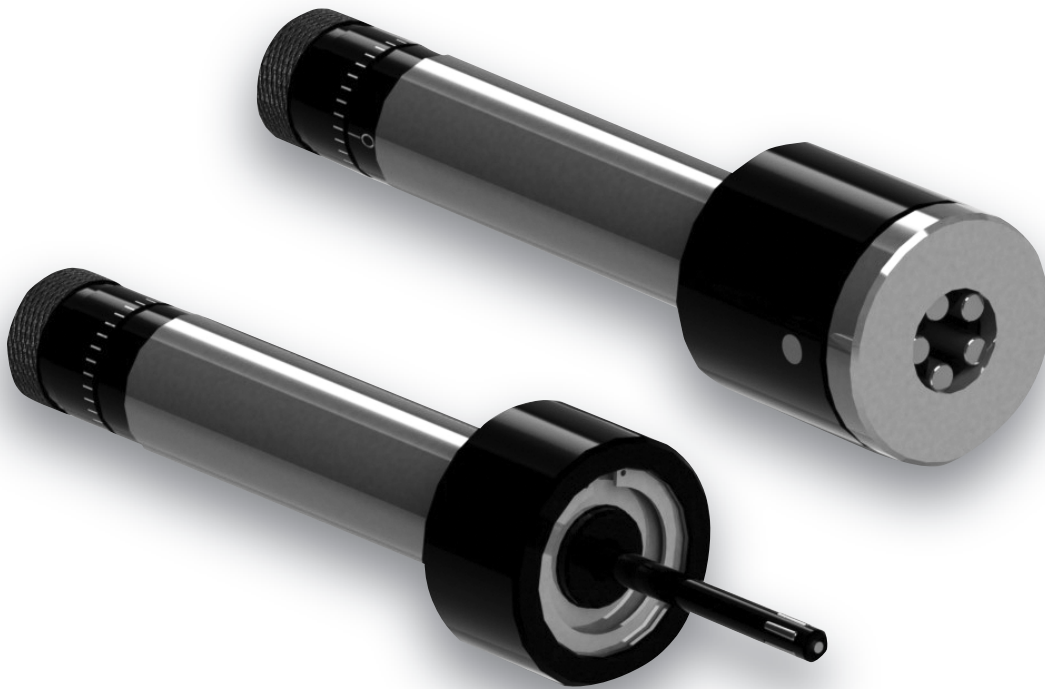


“AEX-3” SERIES ROLL-A-FINISH® TOOLS 1-13/32 TO 2.000 IN. (35.7 TO 50.8 MM)
All AEX-3 tools are machine fed tools. For bottoming (blind bore) tools, see notes below.

DIAMETER RANGE		TOOL #	COMMON WEAR PARTS		
INCHES	MM	THRU-HOLE	ROLL	RACE	CAGE
1.405-1.426	35.69-36.22	AEX-3-01422	SR-01125-D14 7 REQUIRED PER SET	AEX-01422-D16	AEX-01422-D14
1.420-1.441	36.07-36.60	AEX-3-01438		AEX-01438-D16	AEX-01438-D14
1.436-1.457	36.47-37.01	AEX-3-01453		AEX-01453-D16	AEX-01453-D14
1.452-1.473	36.88-37.41	AEX-3-01469		AEX-01469-D16	AEX-01469-D14
1.467-1.488	37.26-37.80	AEX-3-01484		AEX-01484-D16	AEX-01484-D14
1.483-1.504	37.67-38.20	AEX-3-01500		AEX-01500-D16	AEX-01500-D14
1.499-1.520	38.07-38.61	AEX-3-01516		AEX-01516-D16	AEX-01516-D14
1.514-1.535	38.46-38.99	AEX-3-01531		AEX-01531-D16	AEX-01531-D14
1.530-1.551	38.86-39.40	AEX-3-01547		AEX-01547-D16	AEX-01547-D14
1.545-1.566	39.24-39.78	AEX-3-01562		AEX-01562-D16	AEX-01562-D14
1.561-1.582	39.65-40.18	AEX-3-01578		AEX-01578-D16	AEX-01578-D14
1.577-1.598	40.06-40.59	AEX-3-01594		AEX-01594-D16	AEX-01594-D14
1.592-1.613	40.44-40.97	AEX-3-01609		AEX-01609-D16	AEX-01609-D14
1.608-1.629	40.84-41.38	AEX-3-01625		AEX-01625-D16	AEX-01625-D14
1.619-1.660	41.12-42.16	AEX-3-01656		AEX-01656-D16	AEX-01656-D14
1.651-1.692	41.94-42.98	AEX-3-01688		AEX-01688-D16	AEX-01688-D14
1.682-1.723	42.72-43.76	AEX-3-01719		AEX-01719-D16	AEX-01719-D14
1.713-1.754	43.51-44.55	AEX-3-01750		AEX-01750-D16	AEX-01750-D14
1.744-1.785	44.30-45.34	AEX-3-01781		AEX-01781-D16	AEX-01781-D14
1.775-1.816	45.09-46.13	AEX-3-01812		AEX-01812-D16	AEX-01812-D14
1.807-1.848	45.90-46.94	AEX-3-01844	AEX-01844-D16	AEX-01844-D14	
1.838-1.879	46.69-47.73	AEX-3-01875	AEX-01875-D16	AEX-01875-D14	
1.869-1.910	47.47-48.51	AEX-3-01906	AEX-01906-D16	AEX-01906-D14	
1.901-1.942	48.29-49.33	AEX-3-01938	AEX-01938-D16	AEX-01938-D14	
1.932-1.973	49.07-50.11	AEX-3-01969	AEX-01969-D16	AEX-01969-D14	
1.963-2.004	49.86-50.90	AEX-3-02000	AEX-02000-D16	AEX-02000-D14	

Shanks other than shown above are available upon request. Race Assembly consists of rolls, race, & cage. (Add -RA to tool #)
 For bottoming (blind bore) tools, designate tool number as AEXB.

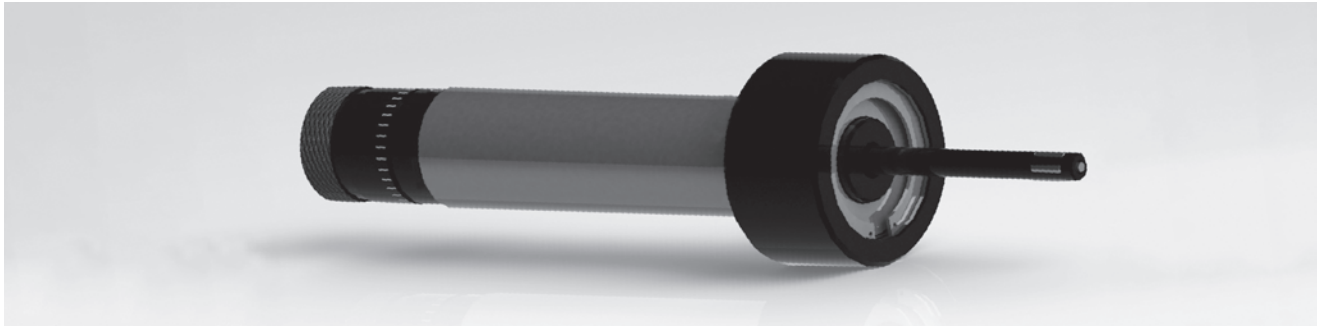
Micro Roller Burnishing tools



Micro Roller Burnishing Tools *feature:*

- Compact design for use where limited space is available on multi-spindle SWISS and screw type machines.
- Internal tools from 0.187–0.501 inch (4.75–12.73mm) in thru style, and bottoming style larger than 0.246 inch (6.25mm).
- External tools from 0.054–0.254 inch (1.37–6.45mm) in bottoming style.
- Unique rear adjustment mechanism.

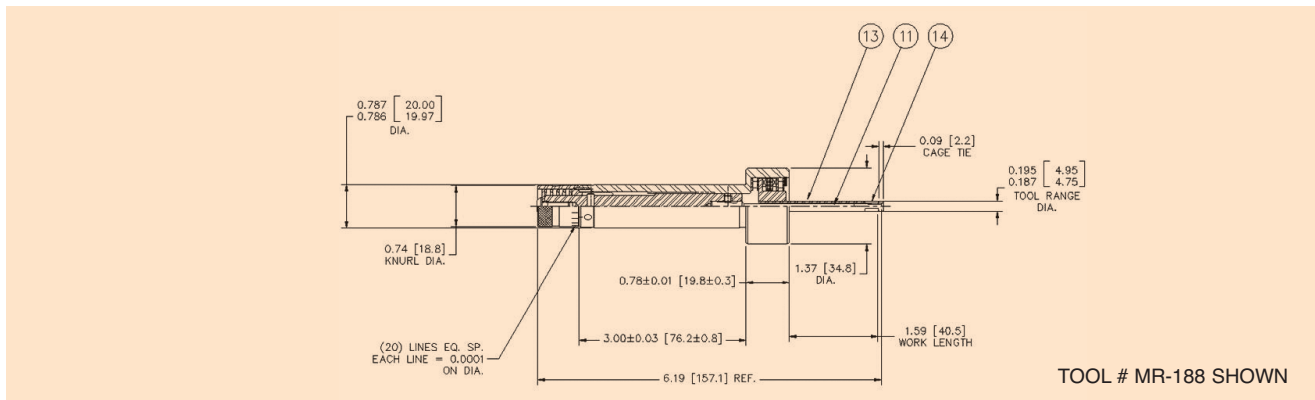
Standard tool specifications



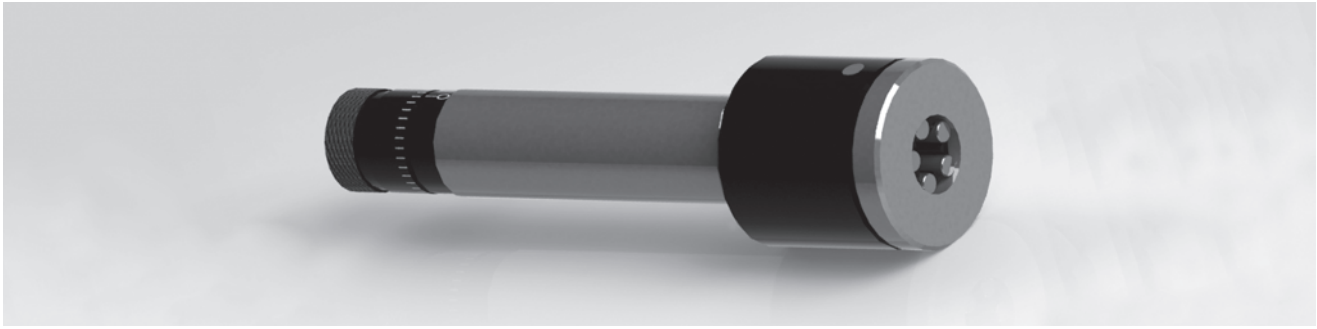
Internal Micro Roller Burnishing Tool .187 TO .500 IN. (4.75 TO 12.7 MM)
 20 mm shank standard, 0.750 inch diameter shank available.

DIAMETER RANGE		TOOL #	ROLL	MANDREL	CAGE
INCHES	MM				
.187 - .195	4.75 - 4.95	MR-00188	SR-00187-D14 3 REQUIRED PER SET	MR-00188-D11	MR-00188-D13
.194 - .202	4.93 - 5.13	MR-00195		MR-00195-D11	MR-00195-D13
.202 - .210	5.13 - 5.33	MR-00203		MR-00203-D11	MR-00203-D13
.210 - .218	5.33 - 5.54	MR-00211		MR-00211-D11	MR-00211-D13
.218 - .226	5.54 - 5.74	MR-00219		MR-00219-D11	MR-00219-D13
.225 - .233	5.72 - 5.92	MR-00226		MR-00226-D11	MR-00226-D13
.233 - .241	5.92 - 6.12	MR-00234		MR-00234-D11	MR-00234-D13
.241 - .249	6.12 - 6.32	MR-00242		MR-00242-D11	MR-00242-D13
.246 - .267	6.25 - 6.78	MR-00250	SR-00250-D14 5 REQUIRED PER SET	MR-00250-D11	MR-00250-D13
.262 - .283	6.65 - 7.19	MR-00266		MR-00266-D11	MR-00266-D13
.277 - .298	7.04 - 7.57	MR-00281		MR-00281-D11	MR-00281-D13
.293 - .314	7.44 - 7.98	MR-00297		MR-00297-D11	MR-00297-D13
.308 - .329	7.82 - 8.36	MR-00312	SR-00312-D14 5 REQUIRED PER SET	MR-00312-D11	MR-00312-D13
.324 - .345	8.23 - 8.76	MR-00328		MR-00328-D11	MR-00328-D13
.340 - .361	8.64 - 9.17	MR-00344		MR-00344-D11	MR-00344-D13
.355 - .376	9.02 - 9.55	MR-00359	SR-00375-D14 5 REQ'D PER SET	MR-00359-D11	MR-00359-D13
.371 - .392	9.42 - 9.96	MR-00375		MR-00375-D11	MR-00375-D13
.387 - .408	9.83 - 10.36	MR-00391		MR-00391-D11	MR-00391-D13
.402 - .423	10.21 - 10.74	MR-00406		MR-00406-D11	MR-00406-D13
.418 - .439	10.62 - 11.15	MR-00422		MR-00422-D11	MR-00422-D13
.434 - .455	11.02 - 11.56	MR-00438	SR-00438-D14 5 REQUIRED PER SET	MR-00438-D11	MR-00438-D13
.449 - .470	11.40 - 11.94	MR-00453		MR-00453-D11	MR-00453-D13
.465 - .486	11.81 - 12.34	MR-00469		MR-00469-D11	MR-00469-D13
.480 - .501	12.19 - 12.73	MR-00484		MR-00484-D11	MR-00484-D13

Note: Bottoming (blind bore) tools available in sizes .250 and larger. Designate "MR" as "MRB".



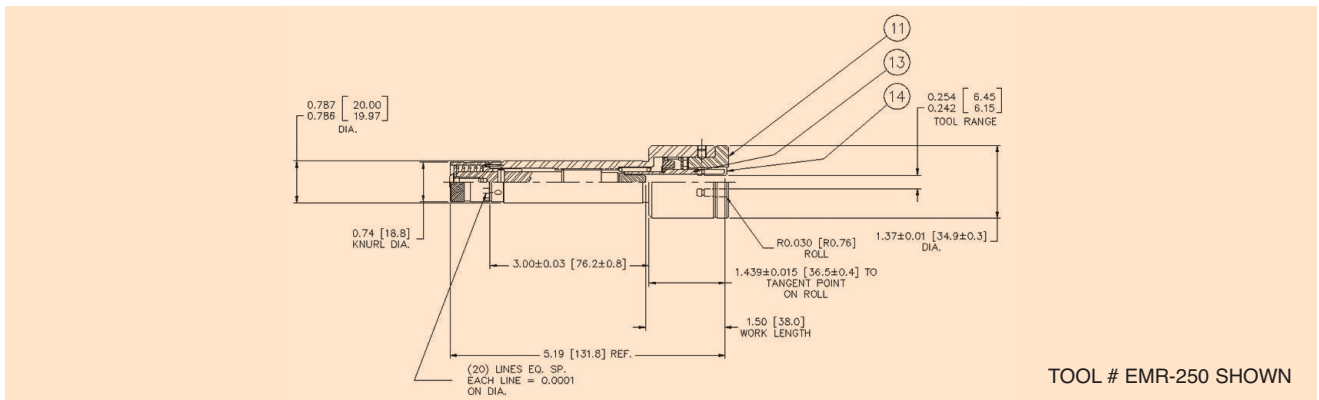
Standard tool specifications



External Micro Roller Burnishing Tool 0.054 TO .250 IN. (1.37 TO 6.35 MM)
 20 mm shank standard, 0.750 inch diameter shank available.

DIAMETER RANGE		TOOL #	ROLL	MANDREL	CAGE
INCHES	MM				
.054 - .066	1.37 - 1.68	EMR-00062	RB-00500-D14 3 REQUIRED PER SET	EMR-00062-D11	EMR-00062-D13
.062 - .074	1.57 - 1.88	EMR-00070		EMR-00070-D11	EMR-00070-D13
.070 - .082	1.78 - 2.08	EMR-00078		EMR-00078-D11	EMR-00078-D13
.078 - .090	1.98 - 2.29	EMR-00086		EMR-00086-D11	EMR-00086-D13
.086 - .098	2.18 - 2.49	EMR-00094		EMR-00094-D11	EMR-00094-D13
.094 - .106	2.39 - 2.69	EMR-00102		EMR-00102-D11	EMR-00102-D13
.103 - .115	2.62 - 2.92	EMR-00111		EMR-00111-D11	EMR-00111-D13
.109 - .121	2.77 - 3.07	EMR-00117		EMR-00117-D11	EMR-00117-D13
.117 - .129	2.97 - 3.28	EMR-00125		EMR-00125-D11	EMR-00125-D13
.125 - .137	3.18 - 3.48	EMR-00133		EMR-00133-D11	EMR-00133-D13
.133 - .145	3.38 - 3.68	EMR-00141		EMR-00141-D11	EMR-00141-D13
.141 - .153	3.58 - 3.89	EMR-00149		EMR-00149-D11	EMR-00149-D13
.148 - .160	3.76 - 4.06	EMR-00156		EMR-00156-D11	EMR-00156-D13
.156 - .168	3.96 - 4.27	EMR-00164		EMR-00164-D11	EMR-00164-D13
.163 - .175	4.14 - 4.45	EMR-00171		EMR-00171-D11	EMR-00171-D13
.172 - .184	4.37 - 4.67	EMR-00180		EMR-00180-D11	EMR-00180-D13
.179 - .191	4.55 - 4.85	EMR-00187		EMR-00187-D11	EMR-00187-D13
.187 - .199	4.75 - 5.05	EMR-00195		EMR-00195-D11	EMR-00195-D13
.195 - .207	4.95 - 5.26	EMR-00203		EMR-00203-D11	EMR-00203-D13
.203 - .215	5.16 - 5.46	EMR-00211		EMR-00211-D11	EMR-00211-D13
.211 - .223	5.36 - 5.66	EMR-00219		EMR-00219-D11	EMR-00219-D13
.219 - .231	5.56 - 5.87	EMR-00227		EMR-00227-D11	EMR-00227-D13
.226 - .238	5.74 - 6.05	EMR-00234		EMR-00234-D11	EMR-00234-D13
.234 - .246	5.94 - 6.25	EMR-00242		EMR-00242-D11	EMR-00242-D13
.242 - .254	6.15 - 6.45	EMR-00250	5 REQ'D PER SET	EMR-00250-D11	EMR-00250-D13

Note: All EMR Series tools are bottoming style.



Selection & ordering information

Internal Roll-a-Finish® tools

Specify tool number. First select series SR, or U. If helix (self-feeding) cage is desired, add an “H.” Add a “B” if a bottoming tool is desired. Next, indicate nominal tool size. (Examples: SR-500; SRH-750; SRB-1000).

If extra work length is desired, designate by adding the suffix -4, -6, or -8. (Examples: SR-750-4, SRH-750-6, SRB-750-8). If no work length is specified, we will supply the shortest work length, which is shown in the respective tool specifications for each series.

When ordering bottoming-style tools, please furnish part print or detailed sketch.

External Roll-a-Finish® tools

When ordering external Roll-a-Finish tools, specify tool number. Add a “B” to the tool number if a bottoming tool is desired.

(Examples: AEX-1-250; AEXB-2-500; AEX-3-1500).

For bottoming-style tools, please furnish part print or detailed sketch.

Replacement parts

For mandrel or race assemblies, specify tool number and description of part. (Examples: SRH-500 mandrel assembly; AEX-1-375 race assembly.)

Order individual components by detail number (if known), description, and tool number. (Example: Detail 13 cage for SR-750.)*

Order replacement rolls in complete sets. (NOTE: Mixing new and used rolls will reduce the effectiveness of the tool.) Specify detail number (if known), description, and tool number. (Example: Detail 14 set of rolls for SR-1000.)*

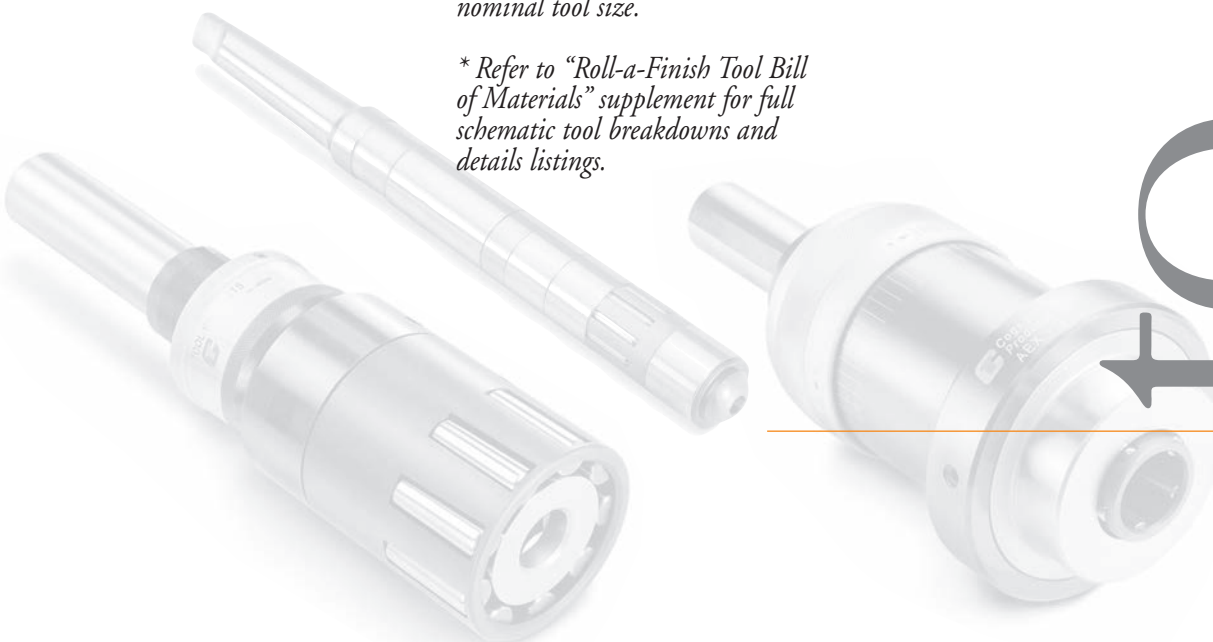
NOTE: Use cage marking to establish nominal tool size.

** Refer to “Roll-a-Finish Tool Bill of Materials” supplement for full schematic tool breakdowns and details listings.*

Bearingizing tools

For tool selection and ordering information for Bearingizing tools and replacement parts, please refer to page 38.

to order



Part preparation & operating parameters for roller burnishing

Note

The following instructions are intended for use with standard Cogsdill Roll-a-Finish tools. If your tool is a special design, please refer to your tool drawing for special operating parameters.

Machines

Cogsdill Roll-a-Finish tools are extremely versatile. The tool can be used on any type of shop machinery, including lathes, drill presses, machining centers, or any rotating spindle. Standard tools are designed for right-hand rotation, with either tool or part rotating.

Material

Almost any metal, particularly any ductile or malleable metal, such as steel, stainless, alloy, cast iron, aluminum, copper, brass, bronze, etc., may be successfully roller burnished. Hardness should normally be less than 40 on the Rockwell "C" scale. (If hardness exceeds Rc 40 consult Cogsdill's Engineering Department.)

Part preparation

Proper part preparation is essential to obtain optimum results from roller burnishing. Due to the fact that no metal is removed in the process, finish depends upon the existence of a uniform and tearfree surface which will be caused to flow under the pressure exerted through the rolls

An 80-120 microinch surface (2 - 3 micrometers), which is typical of boring or turning, is considered an ideal surface for roller burnishing. This relatively rough prefinish allows the Roll-a-Finish tool to displace a greater amount of material on the surface of the workpiece. It also allows the prefinish tolerance to be much greater than with a smoother prefinish. A smoother prefinish reduces the roller burnishing effect, which means the prefinished size must be much closer to the acceptable tolerance

The ideal prefinish prior to roller burnishing is related to such variables as material, hardness, and tolerance requirements. Final part requirements of size, finish, and hardness will dictate preparation requirements, and some trial runs may be necessary in order to determine the ideal prefinish.

Final size of a workpiece depends upon its initial dimension and surface preparation. A very smooth prefinish cannot be reduced in size as much as a rougher prefinish. Successful results from roller burnishing depend upon the prefinish operation and will vary as shown in the Stock Displacement chart on page 27. The displacement column in the chart shows how much change in size may be expected for each starting or prefinished condition.

If sizing, finishing, and work hardening are to be optimized for a particular application, initial part preparation is critical and fine tool adjustment is necessary.



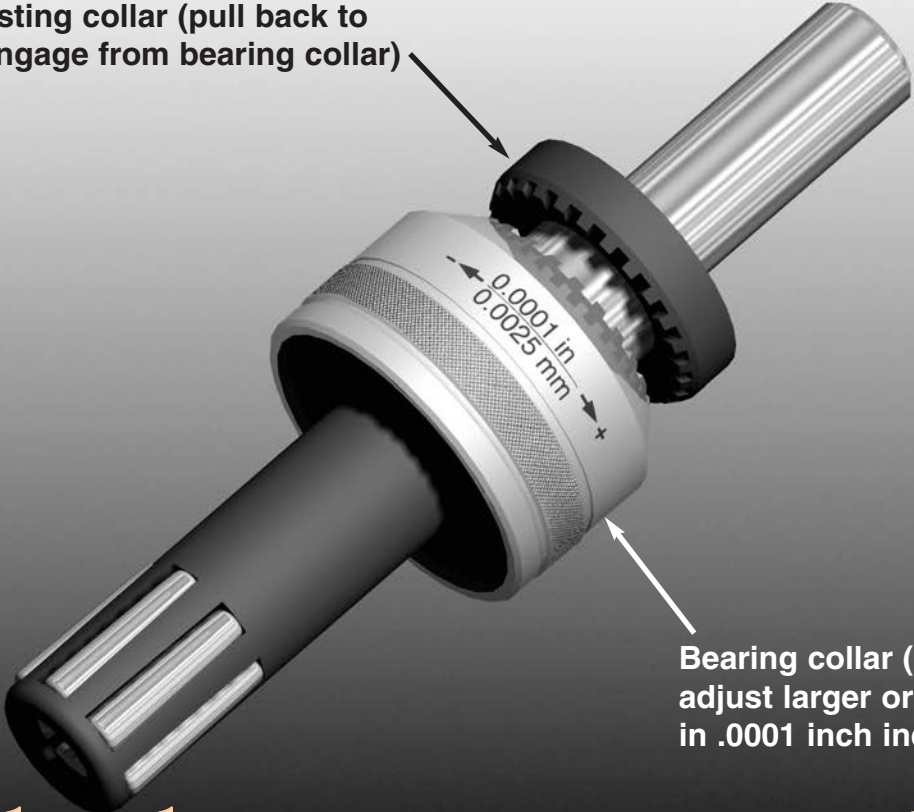
Part preparation & operating parameters for roller burnishing

Tool adjustment procedure

Cogsdill Tool Products manufactures a variety of standard Roll-a-Finish Tools. Although the detail numbers and nomenclature for the adjustment components differ somewhat for the various tool series, the adjustment procedure for all Roll-a-Finish tools is basically the same.

For all SR, U, and AEX-1 tools, a rear castellated adjusting collar interlocks with a threaded and castellated bearing collar to keep the tool in adjustment. In order to adjust the tool, retract the spring-loaded adjusting collar and rotate the threaded bearing collar. This will alter the position of the tapered mandrel or race in relation to the tapered rolls, thereby changing the effective tool diameter within the specified diameter range. AEX-2 and AEX-3 tools have a locking ring instead of a castellated adjusting collar; tool adjustment requires the use of an Allen wrench. SR and AEX series tools adjust in increments of .0001 inch (.002mm). U series tools adjust in increments of .0002 inch (.005mm.)

Spring-loaded non-rotating adjusting collar (pull back to disengage from bearing collar)



Bearing collar (rotate to adjust larger or smaller in .0001 inch increments)

tool adjustment procedure

Part preparation & operating parameters for roller burnishing

Follow these steps when adjusting a Roll-a-Finish® tool:

- 1** The first step is to rotate the adjustment collar assembly in a plus or minus direction as marked on the tool until the workpiece will just slip over the rolls. This procedure is similar to plug or ring gaging a part. This will set tool working diameter the same as prepared part diameter.
- 2** Retract the tool from the part and increase tool working diameter by approximately .0005 to .001 inch (.01 to .02mm) over the prepared part diameter. On SR and AEX tools, a one-notch change equals .0001 inch (.002mm) diameter change. On U series tools, which are tools over 2.500 inches (63.5mm) in diameter, calibrations are in .0002 inch (.005mm) increments.
- 3** Now, run the first part and check for finish. Readjust tool diameter as necessary to obtain desired surface finish. Several trial runs may be necessary; however, once properly adjusted, only one pass of the tool is required for roller burnishing.
- 4** Measure finished parts for size. The difference between the prefinished and roller burnished sizes represents actual stock displacement. If necessary, modify the prefinished size to allow for more or less stock displacement.
- 5** If the prefinished size is changed, the burnishing tool must be adjusted by the same amount as the cutting tool to produce the desired finish.

Stock displacement

Approximate prefinishes resulting from common machining operations and the probable displacements produced by the roller burnishing process are listed below:

PREFINISH OPERATION	PREFINISH SURFACE	
	Microinches	Micrometers
Hone	10-20	.25-.50
Grind	20-40	.50-1.00
Ream	40-60	1.00-1.50
Bore, Turn (Medium)	80-100	2.00-3.00
Bore, Turn (Rough)	150-200	3.75-5.00

PREFINISH OPERATION	EXPECTED DISPLACEMENT BY BURNISHING	
	Inches	Millimeters
Hone	.0001-.0002	.002-.005
Grind	.0002-.0004	.005-.010
Ream	.0004-.0006	.010-.015
Bore, Turn (Medium)	.0008-.0012	.020-.030
Bore, Turn (Rough)	.0015-.0020	.038-.050

Surface finishes of 10 microinches (.25micrometers) Ra and below are obtainable provided that the prepared surface is uniform and tearfree.

Tool operation

Standard Roll-a-Finish tools are designed for right-hand rotation.

SRH and UH self-feeding tools have cages with roll pockets that are positioned at a slight helix angle so that the tool is self-feeding. SR, AEX, and all bottoming-style tools (SRB, UB, and AEXB) do *not* feature the helix angle on the roll pockets; these tools require machine-feeding.

When the Roll-a-Finish tool reaches the end of the desired roller burnishing length, pull the tool from the bore (rapid-out) feeding out not required. This reverse action causes the rolls to collapse slightly in the cage to make withdrawal easy.

Part preparation & operating parameters for roller burnishing

Coolant

For most metals use any standard grade, light-weight, low-viscosity lubricating oil, or any mineral, sulphur, or soluble oil compatible with the metal or alloy to be burnished and recommended for fine surface finishing.

For aluminum or magnesium alloys use a highly refined oil-based coolant with low viscosity.

For cast iron a mineral seal oil is ideal. Flooding the part is recommended.

Filtration of the coolant is highly recommended to remove metal particles and grit.

Maintenance & repair

The Roll-a-Finish tool requires only routine maintenance. For long tool life and optimum performance, tool should be kept free of grit and other foreign matter. Rolls, cage, and mandrel should be examined at regular intervals and replaced when the desired size and finish are no longer obtainable. It is always advisable to replace a complete set of rolls, as there will be some sacrifice of tolerance and finish quality if new and used rolls are mixed.

Tools may be returned to Cogsdill for inspection and reconditioning to return them to original operating performance. Contact Cogsdill's Returns Department for a Return Material Authorization Number to assist us in processing your repair order. We will advise price and delivery before proceeding with the repair.

Interchangeability

Mandrel and race assemblies are interchangeable with tool adjustment assemblies within specified ranges. For example, the "SR"-style tools from .500 to 1.000 inch (12.7 to 25.4mm) have a common adjustment assembly.

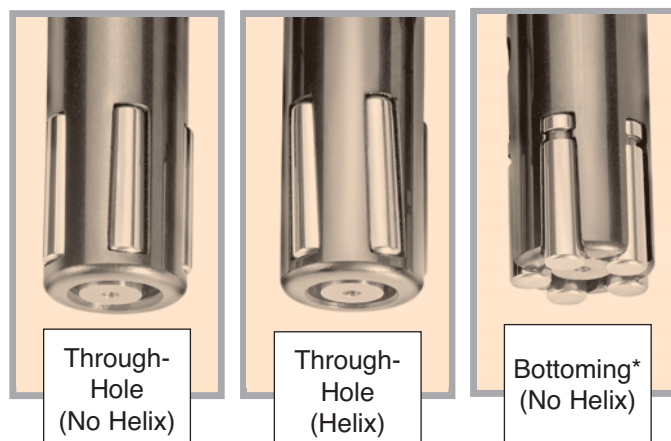
All standard Roll-a-Finish tools .500 inch and above can be changed from through-hole to bottoming by changing cage and rolls.

Speed and feed recommendations for internal Roll-a-Finish tools with self-feeding cages ⁽¹⁾

DIAMETER		RPM	FEED PER REVOLUTION	
INCHES	MM		INCHES	MM
.187	4.76	1500-4300	.010-.012	.2540-.3048
.250	6.35	1500-4300	.010-.012	.2540-.3048
.312	7.94	1300-3700	.012-.014	.3048-.3556
.375	9.52	1020-3100	.016-.020	.4064-.5080
.437	11.11	875-2600	.018-.023	.4572-.5842
.500	12.70	765-2300	.018-.023	.4572-.5842
.562	14.28	675-2000	.018-.023	.4572-.5842
.625	15.87	610-1800	.030-.036	.7620-.9144
.750	19.05	505-1500	.030-.036	.7620-.9144
.875	22.22	335-1300	.034-.039	.8636-.9906
1.000	25.40	380-1100	.048-.052	1.219-1.321
1.125	28.57	340-1000	.051-.056	1.295-1.422
1.250	31.75	305-900	.064-.069	1.625-1.752
1.375	34.92	275-825	.077-.082	1.956-2.083
1.500	38.10	255-750	.090-.095	2.286-2.413
1.625	41.27	235-700	.084-.088	2.133-2.235
1.750	44.45	215-650	.097-.101	2.464-2.565
1.875	47.62	205-610	.110-.114	2.794-2.895
2.000	50.80	190-575	.123-.127	3.124-3.226
2.125	53.97	180-540	.136-.141	3.454-3.581
2.250	57.15	170-510	.149-.154	3.785-3.912
2.375	60.32	160-485	.162-.167	4.115-4.242
2.500	63.50	150-460	.175-.180	4.445-4.572
2.625	66.67	145-435	.088-.090	2.235-2.286
2.750	69.85	140-415	.095-.097	2.413-2.464
2.875	73.02	130-400	.101-.102	2.565-2.591
3.000	76.20	125-380	.101-.103	2.565-2.616
3.500	88.90	110-325	.128-.130	3.251-3.302
4.000	101.60	95-285	.154-.156	3.912-3.962

(1) When the self-feeding tool is used with power feed, the feed rate MUST exceed the maximum feed rate (shown at left) for a given size. This prevents the rolls from collapsing in the cage and eliminating the burnishing action.

POWER FEEDING CAGES: The feed rate for "SR" and bottoming-style "B" tools with power-feeding cages must be from .010 IPR (.25mm/rev.) up to the maximum rate (shown at left) for the self-feeding tools for the same diameter.

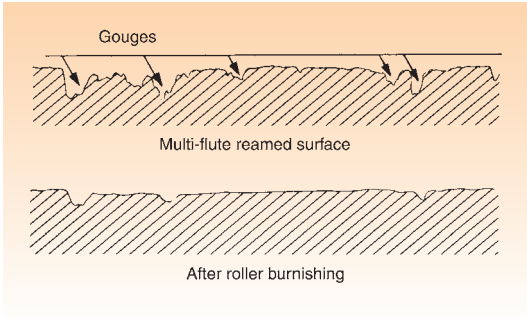
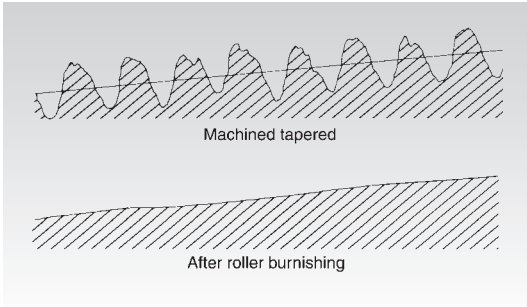
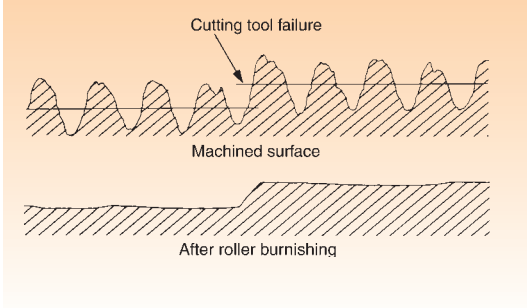


*Mandrel may be cut off if it does not allow full bottoming.

Part preparation & operating parameters for roller burnishing

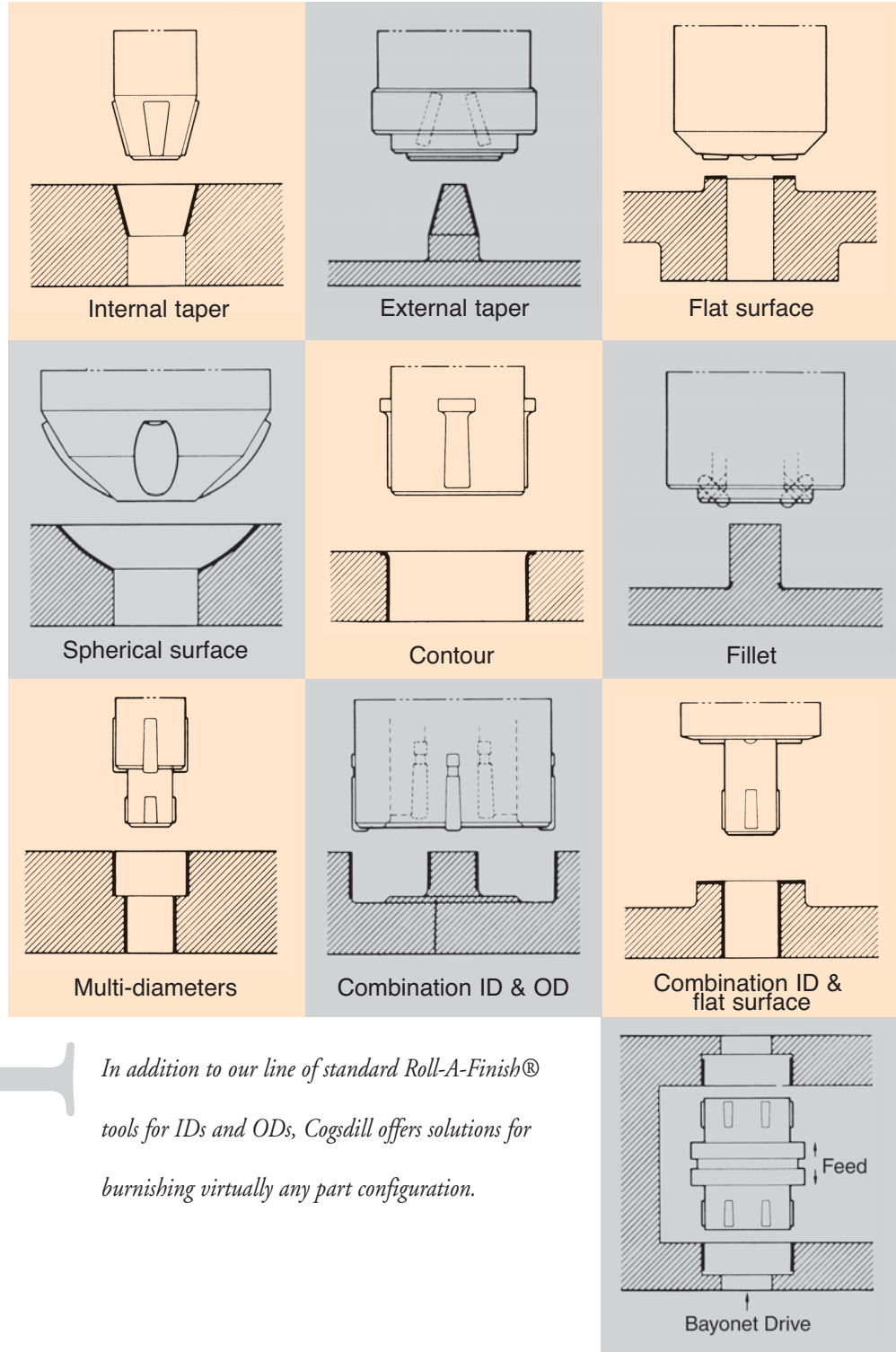
TROUBLE-SHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSE	SOLUTION
1. FINISH		
A. Scratches	Foreign material Worn rolls.	Clean filter coolant. Inspect – Replace if discolored or marred.
B. Flaking.	Too much interference. Too much friction.	Adjust for less interference More lubricity in coolant.
C. Spiral marks. Residual tool marks.	Premachining too smooth, or not uniform.	Sharper radius cutting tool, replace or sharpen. Increase feed of cutting tool.
	Not enough burnishing.	Increase tool diameter, pressure support part wall if thin, or consider Bearingizing.
	Roll stuck, or foreign matter stuck in pocket.	Inspect and clean cage, replace if necessary.
	Roll paths not overlapping. Chips left in bore.	Decrease feed rate. Flush prior to burnishing.
2. SIZE		
A. Too small or large after burnishing.	Incorrect stock allowance.	Adjust cutting tool (resize) and Roll-a-Finish tool.
B. Bell mouth or taper.	Premachining problem	Check before burnishing.
	Misalignment. Tool runout. Part has thin wall, irregular geometry, or no support.	Correct or use floating holder. Indicate mandrel-repair. Support by fixture or consider Bearingizing.
3. (MISC.)		
A. Rolls hit on entry.	Misalignment.	Correct alignment.
	Too much roll projection.	Chamfer part-if possible. Retain with O'Ring or similar device if a short bore. Use smaller cage, if interchangeable. Or, select a tool with your part size on the higher end of the adjustment range.
B. Can't burnish entire length of bore.	Tool too short. Mandrel hits bottom of bore or fixture.	Use R-style or consider special tool. Grind mandrel tip off, use larger tool size, or consider special tool.

Effects of poorly machined surfaces on burnishing



Special applications & tool designs

Specials



In addition to our line of standard Roll-A-Finish® tools for IDs and ODs, Cogdill offers solutions for burnishing virtually any part configuration.

Special applications & tool designs

In 1993 Cogsdill Tool Products acquired The Madison Microller® Product Line. In 2012, Cogsdill acquired the Roll-A-Matic burnishing product line. With the combined experience of over a century of designing and manufacturing burnishing tools and machines, Cogsdill is unquestionably the world leader in special burnishing tool designs and applications engineering.

A few examples of our thousands of special tool designs are shown below:



Internal taper tool

Flat surface tool

Where part size varies and surface finish is the primary requirement, expanders, contractors, and compensating tools produce consistently excellent surface finishes.

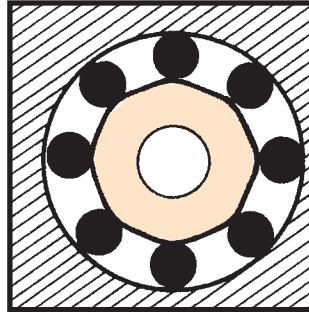


Air-actuated compensating tool

Expander tool

Send us a part print or detailed sketch and request a quotation.

Bearingizing tools



The Bearingizing Tool combines roller burnishing with peening action. As the tool is rotated at a high speed the rolls spin, rise, and fall over a cammed arbor, delivering up to 200,000 rapid fire blows per minute to the work surface. The peaks and valleys of the machined surface are compacted into a smooth, hardened, and ultrafine surface finish.

The Bearingizer *may* be the tool of choice where the following conditions exist:

- Parts with *thin walls* — Bearingizing eliminates barrel-shaping of the part.
- Parts with *irregular wall thicknesses* — the Bearingizing tool will produce a very round hole, whereas the Roll-a-Finish® tool might generate a slightly egg-shaped hole, due to variations in wall thickness.
- Applications where *porosity* is an issue (e.g., oil-impregnated bearings) — the smaller “footprint” of the Bearingizing roll leaves pores in the surface intact.
- Applications where *very tight tolerances* must be held — the Bearingizer reduces springback in the work surface material. The Bearingizing tool can, in some materials and with proper part preparation, hold size as close as ± 0.0001 inch (.002mm), while the Roll-a-Finish tool can achieve tolerances of ± 0.00025 inch (.006mm).

Where the above conditions do *not* exist, the Roll-a-Finish® tool would generally be the tool of choice, for two reasons:

- (1) the relatively wide adjustment range of the Roll-a-Finish tool, which is typically .040 inch (1.01mm), and
- (2) the ease of adjustment, with the castellated adjusting collar on the Roll-a-Finish tool.

The Bearingizing tool features a greater number of rolls, and rolls of a smaller diameter, as compared to the Roll-a-Finish tool, and can only be adjusted by change of rolls. The Bearingizer also requires a closer presize than the Roll-a-Finish tool.

But where the above conditions *do* exist, the Bearingizing tool should be considered.

While the Roll-a-Finish Tool increases surface hardness by about 5 to 10%, Bearingizing increases hardness by 10 to 30%, but with less surface penetration.

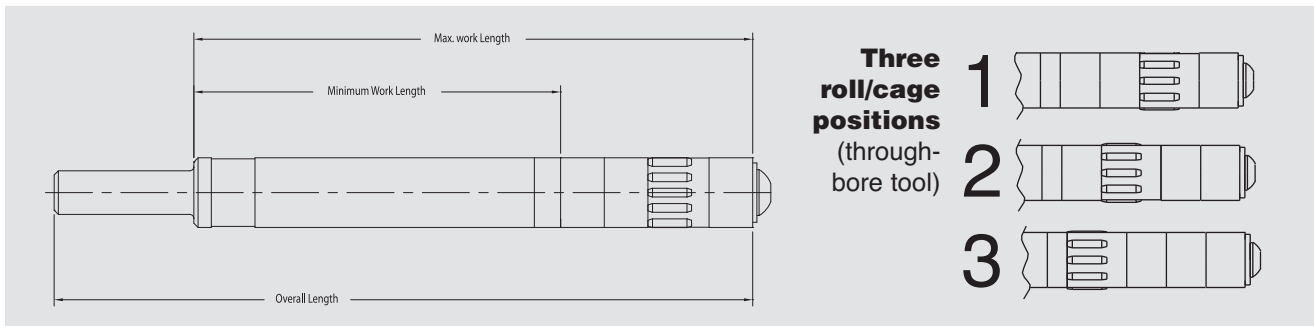


Tool specifications

Bearingizing tools provide three roll positions over the cammed arbor (see below). When the forward (#1 position) of cam becomes worn, the roll cage can be repositioned to the # 2 and # 3 positions by exchanging positions with the moveable collars. This presents NEW cam surfaces and original BUILD-UP. After all positions

on the cam are worn beyond producing acceptable parts, oversize rolls can be used to further extend tool life. Roll sizes are available in increments of .0001 inch (.0025 mm) and the tool will accommodate a range of roll sizes up to .002 inch (.0508 mm).

For through-hole, semi-bottoming, or bottoming applications.



Bearingizing Tools .188 to 1.250 in. (4.76 to 31.75mm)

NOMINAL TOOL SIZE		BUILD-UP RANGE		CAM DIAMETER		SHANK	OVERALL LENGTH		WORK LENGTH				NO. OF ROLLS
INCHES	MM	INCHES	MM	INCHES	MM		INCHES	MM	MAXIMUM		MINIMUM		
									INCHES	MM	INCHES	MM	
.188	4.76	.1861 .1901	4.727 4.829	.1281	3.254	↑	5.5	139.7	2.938	74.61	2.188	55.56	6
.219	5.56	.2174 .2214	5.522 5.624	.1594	4.049		5.5	139.7	2.938	74.61	2.188	55.56	6
.236	6	.2343 .2383	5.951 6.053	.1670	4.242		6	152.4	3.438	87.31	2.375	60.32	6
.250	6.35	.2486 .2526	6.314 6.416	.1806	4.587		6	152.4	3.438	87.31	2.375	60.32	6
.276	7	.2743 .2783	6.967 7.069	.2064	5.243		6	152.4	3.438	87.31	2.313	58.74	6
.281	7.14	.2799 .2839	7.109 7.211	.2119	5.382		6	152.4	3.438	87.31	2.313	58.74	6
.313	7.94	.3112 .3152	7.904 8.006	.2212	5.618		6	152.4	3.438	87.31	2.313	58.74	6
.315	8	.3137 .3177	7.968 8.069	.2238	5.667	.500 in. DIA. or	6	152.4	3.438	87.31	2.313	58.74	6
.343	8.73	.3425 .3465	8.700 8.801	.2525	6.414		7	177.8	4.438	112.71	3.063	77.79	6
.354	9	.3530 .3570	8.966 9.068	.2631	6.683	12mm DIA.	7	177.8	4.438	112.71	3.063	77.79	6
.375	9.53	.3738 .3778	9.495 9.596	.2518	6.396		7	177.8	4.438	112.71	3.125	79.38	6
.394	10	.3965 .3925	9.970 10.071	.2705	6.871		7	177.8	4.438	112.71	3.125	79.38	6
.406	10.32	.4051 .4091	10.290 10.391	.2831	7.191		8	203.2	5.438	138.11	3.563	90.49	6
.433	11	.4320 .4360	10.973 11.074	.2779	7.059		8	203.2	5.438	138.11	3.688	93.66	6
.438	11.11	.4365 .4405	11.087 11.189	.2825	7.176		8	203.2	5.438	138.11	3.688	93.66	6
.469	11.91	.4678 .4718	11.882 11.984	.3138	7.971		8	203.2	5.438	138.11	3.688	93.66	8
.472	12	.4710 .4750	11.963 12.065	.3174	8.062	↓	8	203.2	5.438	138.11	3.688	93.66	8

Tool specifications

Bearingizing tools

Bearingizing Tools .188 to 1.250 in. (4.76 to 31.75mm) *continued*

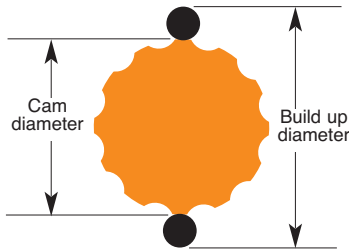
NOMINAL TOOL SIZE		BUILD-UP RANGE		CAM DIAMETER		SHANK	OVERALL LENGTH		WORK LENGTH				NO. OF ROLLS
INCHES	MM	INCHES	MM	INCHES	MM		INCHES	MM	MAXIMUM		MINIMUM		
									INCHES	MM	INCHES	MM	
.500	12.70	.4990 .5030	12.675 12.776	.3450	8.763	↑	8	203.2	5.438	138.11	3.688	93.66	8
.512	13	.5110 .5150	12.979 13.081	.3568	9.063		.500 in. DIA.	8	203.2	5.438	138.11	3.688	93.66
.531	13.49	.5303 .5343	13.470 13.571	.3763	9.558	or	8	203.2	5.438	138.11	3.688	93.66	8
.551	14	.5500 .5540	13.970 14.072	.3962	10.063	12mm DIA.	8	203.2	5.438	138.11	3.688	93.66	8
.563	14.29	.5615 .5655	14.262 14.364	.4075	10.351	↓	8	203.2	5.438	138.11	3.688	93.66	8
.591	15	.5936 .5896	15.077 14.976	.4356	11.064		↑	8	203.2	4.875	123.83	3.125	79.38
.594	15.09	.5928 .5968	15.057 15.159	.4388	11.146		8	203.2	4.875	123.83	3.125	79.38	8
.625	15.87	.6240 .6280	15.850 15.951	.4390	11.151		8	203.2	4.875	123.83	3.125	79.38	8
.630	16	.6290 .6330	15.977 16.078	.4439	11.275		8	203.2	4.875	123.83	3.125	79.38	8
.656	16.67	.6553 .6593	16.645 16.746	.4703	11.946		8	203.2	4.875	123.83	3.125	79.38	8
.669	17	.6680 .6720	16.967 17.069	.4833	12.276		8	203.2	4.875	123.83	3.125	79.38	8
.688	17.46	.6865 .6905	17.437 17.539	.5015	12.738		8	203.2	4.875	123.83	3.125	79.38	8
.709	18	.7080 .7120	17.983 18.085	.5227	13.277	.750 in. DIA.	8	203.2	4.875	123.83	3.125	79.38	10
.719	18.26	.7178 .7218	18.232 18.334	.5328	13.533	or	8	203.2	4.875	123.83	3.125	79.38	10
.748	19	.7470 .7510	18.974 19.075	.5620	14.275	20mm DIA.	8	203.2	4.875	123.83	3.125	79.38	10
.750	19.05	.7490 .7530	19.025 19.126	.5640	14.326		8	203.2	4.875	123.83	3.125	79.38	10
.781	19.84	.7803 .7843	19.820 19.921	.5953	15.121		8	203.2	4.875	123.83	3.125	79.38	10
.787	20	.7860 .7900	19.964 20.066	.6014	15.276		8	203.2	4.875	123.83	3.125	79.38	10
.813	20.64	.8115 .8155	20.612 20.714	.6265	15.913		8	203.2	4.875	123.83	3.125	79.38	10
.827	21	.8260 .8300	20.980 21.082	.6408	16.276		8	203.2	4.875	123.83	3.125	79.38	10
.844	21.43	.8428 .8468	21.407 21.509	.5958	15.133		9	228.60	5.875	149.23	3.75	95.25	10
.866	22	.8650 .8690	11.971 22.076	.6181	15.700		9	228.60	5.875	149.23	3.75	95.25	10
.875	22.22	.8740 .8780	22.200 22.301	.6270	15.926	↓	9	228.60	5.875	149.23	3.75	95.25	10
.905	23	.9050 .9090	22.987 23.087	.6583	16.721	↑	10	254.00	6.125	155.58	4.00	101.60	10
.906	23.02	.9053 .9093	22.995 23.096	.6583	16.721		10	254.00	6.125	155.58	4.00	101.60	10
.938	23.81	.9365 .9405	23.787 23.889	.6895	17.513		10	254.00	6.125	155.58	4.00	101.60	10
.945	24	.9440 .9480	23.978 24.078	.6969	17.701	1.000 in. DIA.	10	254.00	6.125	155.58	4.00	101.60	10
.969	24.61	.9678 .9718	24.582 24.684	.7208	18.308	or	10	254.00	6.125	155.58	4.00	101.60	12
.984	25	.9830 .9870	24.968 25.070	.7363	18.702	25mm DIA.	10	254.00	6.125	155.58	4.00	101.60	12
1.000	25.40	.9990 1.0030	25.375 25.476	.7520	19.101		10	254.00	6.125	155.58	4.00	101.60	12
1.063	26.99	1.0615 1.0655	26.962 27.064	.8145	20.688		10	254.00	6.125	155.58	4.00	101.60	12
1.125	28.57	1.1240 1.1280	28.550 28.651	.8770	22.276		10	254.00	6.125	155.58	4.00	101.60	12
1.188	30.16	1.1865 1.1905	30.137 30.239	.9395	23.863		10	254.00	6.125	155.58	4.00	101.60	12
1.250	31.75	1.2490 1.2530	31.725 31.826	.9390	23.851	↓	10	254.00	6.125	155.58	4.00	101.60	14

Shanks other than shown above are available upon request.

Selection & ordering information

To select a tool for the part and material to be Bearingized, determine the proper tool *build-up*. The build-up is the effective tool diameter required to produce a certain size in a given material. It is measured with the rolls diametrically opposed on the high surfaces of the cam.

The build-up is equal to the maximum finished hole diameter plus a spring-back allowance — see chart. The maximum diameter (high side of tolerance) is used to allow for tool wear and still maintain part size within tolerance limits.



Nominal tool sizes

The program is based on nominal diameters of .188 inch (4.76mm) through 1.250 inch (31.75mm). Each tool provides a build-up range of .004 inch (.1016mm). The required build-up must be within the range of the tool size shown — otherwise select an intermediate tool. See ordering information at right.

EXAMPLE

Stainless Steel part	
.5010/5008 inch	
(12.725/12.720mm) tolerance	.5010
Add Stainless Steel spring-back allowance	+.0010
Build-up	.5020

Since a .5020 inch (12.75mm) build-up falls within a range of .4990-.5030 inch (12.67-12.78mm), order a nominal .500 inch (12.7mm) through-hole Bearingizing tool and rolls ... or order through-hole Bearingizing tool with .5020 inch (12.75mm) build-up — Cogsdill will furnish proper tool and rolls.

Roll Sizes

To determine the roll size for a standard tool, subtract the cam diameter from the build-up and divide by two (2). This establishes the single roll diameter.

EXAMPLE

Build-up required for part	.5020 inch (12.75mm)
Subtract cam diameter of .500 inch (12.75mm) tool	-.3450 inch (8.76mm)
	.1570 inch (3.99mm)
Divided by 2	.1570 inch ÷ 2 = .0785 inch (1.99mm)
Single roll size	.0785 inch (1.99mm)

Order .500 inch (12.7mm) Bearingizing tool with .0785 inch (1.99mm) rolls.

Spring-Back Allowances	.188 to .500 (4.76 to 12.7 mm)		.500 & up (12.7 mm & up)	
	IN.	mm	IN.	mm
Stainless	.0008	.0203	.001	.0254
Steel	.0008	.0203	.001	.0254
Cast Iron	.0005	.0127	.0008	.0203
Sintered Iron	.0005	.0127	.0008	.0203
Aluminum	.0002	.0050	.0004	.0102
Brass	.0005	.0127	.0008	.0203
Sintered Bronze	.0001	.0025	.0002	.0051
Oilite	.0001	.0025	.0002	.0051

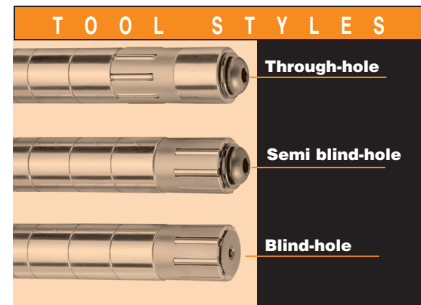
Note: Above are recommended starting points only. Final build-up can best be determined by actual trial and several extra sets of rolls in increments of .0001 inch (.0025mm) are recommended.

Ordering nominal tool sizes

1 Specify tool size and roll diameter, or specify hole size and material.

2 Specify tool style: through-hole, semi-blind or blind-hole tool. Through-hole tools use chamfered rolls; semi-blind or blind-hole tools use radius rolls. Blind-hole tools have a special roll retainer which permits finishing within .025 inch (.635mm) of the bottom.

3 Extra sets of rolls in increments of .0001 inch (.0025mm) are recommended with initial orders to allow for final size adjustment and compensate for eventual tool wear.



Ordering intermediate and larger tools

Intermediate sizes

Sizes that do not fall within the range of nominal tools are ordered by build-up only. Cogsdill will design tool and specify roll size.

Tools over 1.250 inch (31.75mm) in diameter

Order by build-up diameter. Cogsdill will design tool and specify roll size. We suggest that part print be furnished with inquiry. This will enable Cogsdill engineers to quote on any special features that may be desirable, such as extended front pilot, etc.

Re-ordering tools and parts

Re-order nominal size tools and parts by fractional tool size shown on shank—except roll sizes, which should be determined by the required build-up. Re-order intermediate and larger size tools and parts, including rolls by BT number shown on shank. If cams are worn, larger rolls may be required (available in increments of .0001 inch (.0025mm)). Cogsdill will also re-grind cams and supply rolls to maintain original build-up.

Operation & maintenance

Machines

Any machine capable of rotating the tool — e.g. drill press, speed lathe, or turret lathe — may be used.

Material

Any ductile or malleable material — powdered, laminated, cast, forged, extruded, sintered or hardened (maximum Rc 38) can be bearingized. Steel, stainless, alloy, cast iron, aluminum, copper and brass are examples.

Procedure

Proper part preparation is essential in order to obtain precise results. Cogsdill will recommend the surface preparation and amount of stock to leave for Bearingizing, but some trials may be required to determine these factors for optimum results.

Since the change in dimension is partly governed by the character of the prepared surface, usually coarser preparation will permit a greater change in dimension than is possible with finer preparation. The consistent pattern obtained from boring will produce the best finish.

The other major factor in dimensional change is the ability of

the material to grain-flow without flaking. The total change may vary from .0001 inch (.0025mm) on harder materials to as much as .003 inch (.0762mm) on sintered self-lubricating bushings. Less than .001 inch (.0254mm) stock for Bearingizing generally provides a good starting point for trials.

Tool diameter changes

Bearingizing rolls are manufactured in increments of .0001 inch (.0025mm). Bearingizing Tools are adjustable by roll change only. One set of rolls can be removed and a new set of a different size installed, thus effectively changing the size of the tool — or compensating for tool wear. The working diameter of any tool can be changed over an approximate .004 inch (.1016mm) range by installing different sets of rolls. The rolls are diametrically opposed and available in .0001 inch (.0025mm) increments, therefore the effective tool diameter can be changed in .0002 inch (.0051mm) increments.

Lubrication

For most metals use any standard grade of lightweight, low viscosity lubricating oil, or any mineral, sulphur or soluble oil that is compatible with the alloy or metal to be burnished and is recommended for fine surface finishing.

For aluminum or magnesium alloys, use a highly refined oil-based coolant with low viscosity.

For cast iron a mineral seal or water soluble solution is ideal — flooding the part is recommended.

Cleaning

The Bearingizing tool should be cleaned periodically with a light-bodied oil of about 100 Saybolt universal scale, similar to a light spindle oil. A few drops applied with squirt can or brush to the rolls and cage (with cage stopped) will wash metal dust particles out when tool is operated, keeping the cam surfaces and roll pockets clean.

Speed and feed recommendations

HOLE DIAMETER		RPM	HOLE DIAMETER		RPM	HOLE DIAMETER		RPM	HOLE DIAMETER		RPM
INCHES	MM		INCHES	MM		INCHES	MM		INCHES	MM	
.188	4.762	8200	.750	19.050	2000	1.750	44.45	875	2.750	69.85	555
.250	6.350	6100	.875	22.225	1800	1.875	47.62	815	2.875	73.02	530
.312	7.937	4900	1.000	25.40	1500	2.000	50.80	765	3.000	76.20	510
.375	9.525	4100	1.125	28.57	1350	2.125	53.97	720	3.500	88.90	435
.437	11.112	3500	1.250	31.75	1200	2.250	57.15	680	4.000	101.60	380
.500	12.700	3100	1.375	34.92	1100	2.375	60.32	645	4.500	114.30	340
.562	14.287	2700	1.500	38.10	1000	2.500	63.50	610	5.000	127.00	305
.625	15.875	2400	1.625	41.27	950	2.625	66.67	580	5.500	139.70	280

FEED—Feed Rate in and out should be quite rapid, 150-250 inches per minute (3.81M–6.35M), rather than slow.

The speeds and feeds recommended are for best tool life.

The same results can be achieved at slower rate, but with some sacrifice of tool life.

External roller burnishing machines



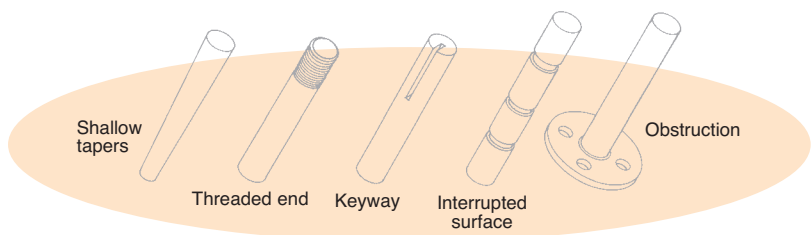
CX-2000



CX-3000

Machines shown above are not to scale.

Cogsdill's CX machines roller burnish cylindrical diameters of any length in seconds. Parts are sized, finished and work hardened by highly polished, precision rollers in one quick pass. Fatigue life, corrosion resistance and appearance are enhanced as your parts are accurately sized and finished. Various model options are designed to meet your manufacturing requirements. Equipment options are available to accommodate through-feed applications, parts with obstructions, and part-to-part size variations.



Shown above are examples of various types of parts which are processed by CX external roller burnishing.

Product features

Versatility

All ductile or malleable metals with hardness up to R/C 40 can be roller burnished. Cylindrical parts of any length, bars, tubing, wire and stranded cable may all be processed with Cogsdill's self-contained, self-feeding roller burnishing machines. A continuously variable speed drive allows the operator to select the optimum production rate for obtaining the desired size and finish. An adjustable tilt base makes it possible to select the ideal feed angle for automatic or manual loading.

Several sub-assembly options are available to suit various application requirements (see page 37, "CX Sub-Assembly Options").

Coolant systems are designed and recommended to supply the necessary part lubrication for burnishing. Part supports, consisting of V-guides faced with teflon, are available for thru-feed applications where long parts require support, or as an aid in workpiece alignment during high production runs. Various power options are available to meet your electrical requirements. The CX-2000 is a heavy duty, high production machine that is ideally used where size or portability is a factor. The CX-3000 is a heavy duty, high production machine designed for permanent installation on the production floor.

These options, combined with the standard features, make the Cogsdill CX machine a useful and versatile machine tool. However, should the wide array of options available with our standard tooling and equipment fail to meet your particular requirements, a variety of special tooling is available on special order. Please submit a part print and request a quotation.

Accurate sizing

Tolerances within .0001 inch (.0025mm) are attainable, depending on variables such as material type, hardness, pre-machining method, and the finish on the part prior to burnishing. A prepared tolerance of .002 inch (.05mm) can usually be reduced by 50 % (.001 inch /.02mm).

Low micro finishing

One pass through a Cogsdill CX machine can quickly reduce a 20-40 microinch Ra (0.5 to 1.0 micrometer) ground surface or an 80-120 microinch (2-3 micrometers)(Ra) turned surface to a mirrorlike 5 microinch (.125 micrometer)(Ra) finish or lower. Parts varying in size as much as .005 inch (.127mm) can be burnished to the same low microfinish with the use of an optional pressure control unit (see Versatility section). The roller burnishing process significantly improves bearing surface over other types of finishing processes and is ideal for shafts running in bushings or oil seals.

Work hardening

Surface hardening of the workpiece is achieved simultaneously with sizing and finishing. With certain materials, increases in surface hardness of up to 3 points on the Rockwell "C" scale are attainable. The smooth, dense, hardened surface produced by the roller burnishing process extends wear life, improves resistance to corrosion and reduces fatigue failures. Friction is also reduced, resulting in noise reduction where shafts are running in bushings.

Appearance improvement

Machined parts (turned or ground) can be roller burnished to lustrous, mirrorlike finishes. Subsequent plating applications will often be improved as roller burnishing removes surface patterns and blemishes resulting from prior machining operations.

Fast processing

Cogsdill CX machines process parts in seconds. Parts are sized, finished and work hardened in one pass. Cylindrical parts of any length are processed at speeds up to 30 feet/minute (9.14 meters/minute).

Roller burnishing can often eliminate time consuming and expensive finishing operations such as grinding or lapping. The result is better quality parts, produced in less time, at a lower cost.

Adjustability

Race assemblies, the working components of the CX machine, are designed to process specific nominal size workpieces. CX-1 race assemblies for diameter range .045 to 1.004 inch (1.15 to 25.50mm) are adjustable in increments of .0001 inch (.0025mm) over a range of .021 inch (.53mm) for each nominal size. CX-2 race assemblies for diameter range .963 to 2.504 inch (25.46 to 63.60mm) are adjustable in increments of .0002 inch (.0051mm) over a range of .041 inch (1.04mm) for each nominal size (see pages 34 and 36 for total range of adjustability for each CX model). Race assemblies are interchangeable within the limits of the operating range for a given model. Changing race assemblies is a 5 minute job requiring little more than the removal of four machine screws.

CX-2000 External roller burnishing machine



CX-2000

The CX-2000 External Roller Burnishing Machine offers quiet, smooth operation in a rigid and stable machine design. Two models are available: an adjustable speed model, with variable frequency drive and digital speed display; and an economical fixed speed model (which can be adjusted, if necessary). Coolant capability is standard on both models. An optional portable cabinet with integral coolant pump is offered (and recommended).

The CX-2000 uses the same interchangeable race assemblies as

the CX-3000-1 for part diameters from .045 to 1.004 inch (1.15 to 25.50mm).

An easy-access control panel is located on the front of the machine. There are three standard power options: 220V single-phase, 220V three-phase, or 440V three-phase. An adjustable tilt base allows for the ideal feed angle, from horizontal to vertical, for automatic or manual part loading. Optional part supports are available for long parts or for workpiece alignment in high-production runs.

Height: 16 inches (406mm)

Width: 31 inches (787mm)

Depth: 20 inches (508mm)

CX® External roller burnishing machines

CX-2000 External roller burnishing machine



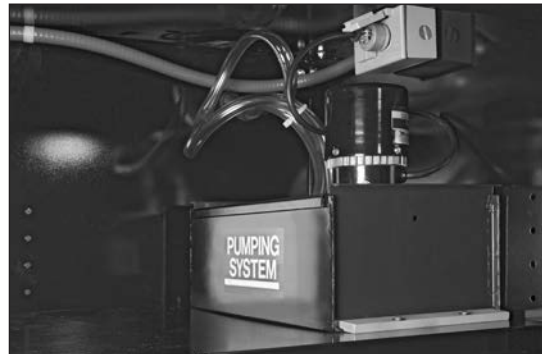
CX-2000 External Roller Burnishing Machine features product design improvements to enhance machine performance.



Interchangeable race assemblies size, finish, and work-harden parts in seconds; through-feed or up to a stop-and release.



Four sub-assembly options enhance machine versatility (interference-to-a-stop shown).



Coolant system lubricates parts and flushes away chips. When optional portable cabinet is purchased, pump comes mounted inside cabinet.



Easy-access control panel is located on the front of the machine.

CX-2000

CX-3000 External roller burnishing machine



CX-3000

The new CX-3000 External Roller Burnishing Machine replaces the former CX-1 and CX-2 model machines. The CX-3000 is designed for permanent installation on the production floor. The CX-3000 machine is available in two models: the CX-3000-1 for part diameters from .045 to 1.004 inch (1.15 to 25.50mm), and the CX-3000-2 for part diameters from .963 to 2.504 inch (25.46 to 63.60mm). The large part diameter range capacity is accomplished by using one base model machine and two interchangeable spindle assemblies

that can be changed by either the customer or by our trained technicians at our factory.

The CX-3000 machine comes standard as an adjustable speed model with variable frequency drive and digital speed display. A coolant system is also standard on the CX-3000 machine.

An easy-access control panel is located on the front of the machine. An adjustable tilt base for ideal feed angle for automatic or manual part loading is available as an option. Part supports are also available as an option for long parts or for

workpiece alignment in high-production runs.

For additional information or to obtain a quotation on the CX-3000 External Roller Burnishing Machine, please contact Cogsdill or one of our Sales Engineers. Also contact Cogsdill for more information on CX Race Assemblies for part diameters over 1.000 inch (25.4mm).

CX sub-assembly options

The CX machine is designed for versatility. Four CX sub-assembly options allow almost any part configuration to be burnished. The machine operates in one of two modes: interference or compensating.

In the interference mode, the working diameter is set slightly smaller (about .0005 inch, or .01mm) than the diameter of the workpiece. The interference mode is used to accurately size and finish parts simultaneously in one fast pass.

The air pressure-controlled compensating unit allows the machine to automatically adjust to different part diameters, within a given range, in order to achieve a surface finish which is consistent regardless of variations in part size. The compensating mode is designed for applications where finish, rather than size, is the primary requirement. The compensating unit can accommodate a size variation of up to .005 inch (.13mm) in a single part, or from part to part. It also allows through-feed burnishing of parts with tapers or enlarged sections where the maximum diameter difference is no more than .030 inch (.76mm).

Each of the two modes is available for through-feed burnishing or with an adjustable stop-and-release mechanism for burnishing parts up to shoulders or obstructions.

The four available CX sub-assemblies are as follows:

- Sub-assembly “A”:
Interference through-feed
- Sub-assembly “B”:
Interference to a stop
- Sub-assembly “C”:
Compensating through-feed
- Sub-assembly “E”:
Compensating to a stop

CX speed and feed recommendations

The information below is intended as a starting point for selecting the speed and feed rate that will produce optimum results in CX® burnishing. Factors such as material type, part configuration, and coolant must be taken into consideration.

Spindle speed is not a critical factor in the successful operation of CX machines. Roller burnishing tools and machines are very tolerant in regard to the effect of spindle speed on resulting surface finishes.

The feed rates are based on using a stationary cage (the part is free to rotate; the anti-rotation spacer is installed). If the thrust bearing is used (i.e., the part is not allowed to rotate) the feed rate will be approximately 1/2 of the feed rate shown.

CX® Speed and feed recommendations

PART NUMBER	RPM	CX IN./REV.	CX-B IN./REV.	CX-R IN./REV.	CX-RB IN./REV.
CX-062	1800	.063	.031	.053	.029
CX-125	1800	.074	.037	.068	.047
CX-187	1800	.084	.042	.075	.037
CX-250	1800	.094	.047	.085	.042
CX-312	1800	.104	.052	.095	.047
CX-375	1800	.115	.057	.106	.053
CX-438	1400	.145	.072	.133	.066
CX-500	1400	.156	.078	.144	.072
CX-562	1400	.166	.083	.154	.077
CX-625	1200	.176	.088	.164	.082
CX-687	1200	.187	.093	.175	.087
CX-750	1200	.197	.098	.185	.092
CX-812	1000	.220	.111	.208	.104
CX-875	900	.233	.116	.218	.109
CX-934	900	.243	.121	.228	.114
CX-1000	900	.254	.127	.238	.119

The production rate of the machine can be calculated as follows:

$$\text{PRODUCTION (inches per minute) IPM} = \text{FEED RATE (inches per revolution) IPR} \times \text{SPEED OF THE MOTOR (revolutions per minute) RPM}$$

RACE ASSEMBLY TYPES*: CX: Interference through-feed; CX-B: Interference to a stop; CX-R: Compensating through-feed; CX-RB: Compensating to a stop

*corresponding to sub-assembly options



CX 2000 Machine Race Assemblies

INTERFERENCE - STYLE					
INCHES	MM	RACE ASSEMBLY #	ROLL #	RACE #	CAGE #
.045 - .066	1.14 - 1.68	CX-1S-00062-RA	R-00500-D14 3 REQUIRED PER SET	CX-1S-00062-D02	CX-1S-00062-D03
.061 - .082	1.55 - 2.08	CX-1S-00078-RA		CX-1S-00078-D02	CX-1S-00078-D03
.077 - .098	1.96 - 2.49	CX-1S-00094-RA		CX-1S-00094-D02	CX-1S-00094-D03
.092 - .113	2.34 - 2.87	CX-1S-00109-RA		CX-1S-00109-D02	CX-1S-00109-D03
.108 - .129	2.74 - 3.28	CX-1S-00125-RA		CX-1S-00125-D02	CX-1S-00125-D03
.124 - .145	3.15 - 3.68	CX-1S-00141-RA		CX-1S-00141-D02	CX-1S-00141-D03
.139 - .160	3.53 - 4.06	CX-1S-00156-RA		CX-1S-00156-D02	CX-1S-00156-D03
.154 - .175	3.91 - 4.45	CX-1S-00171-RA		CX-1S-00171-D02	CX-1S-00171-D03
.170 - .191	4.32 - 4.85	CX-1S-00187-RA		CX-1S-00187-D02	CX-1S-00187-D03
.186 - .207	4.72 - 5.26	CX-1S-00203-RA		CX-1S-00203-D02	CX-1S-00203-D03
.202 - .223	5.13 - 5.66	CX-1S-00219-RA		CX-1S-00219-D02	CX-1S-00219-D03
.217 - .238	5.51 - 6.05	CX-1S-00234-RA		CX-1S-00234-D02	CX-1S-00234-D03
.233 - .254	5.92 - 6.45	CX-1S-00250-RA	R-00500-D14 5 REQUIRED PER SET	CX-1S-00250-D02	CX-1S-00250-D03
.249 - .270	6.32 - 6.86	CX-1S-00266-RA		CX-1S-00266-D02	CX-1S-00266-D03
.264 - .285	6.71 - 7.24	CX-1S-00281-RA		CX-1S-00281-D02	CX-1S-00281-D03
.280 - .301	7.11 - 7.65	CX-1S-00297-RA		CX-1S-00297-D02	CX-1S-00297-D03
.295 - .316	7.49 - 8.03	CX-1S-00312-RA		CX-1S-00312-D02	CX-1S-00312-D03
.311 - .332	7.90 - 8.43	CX-1S-00328-RA		CX-1S-00328-D02	CX-1S-00328-D03
.327 - .348	8.31 - 8.84	CX-1S-00344-RA		CX-1S-00344-D02	CX-1S-00344-D03
.342 - .363	8.69 - 9.22	CX-1S-00359-RA		CX-1S-00359-D02	CX-1S-00359-D03
.358 - .379	9.09 - 9.63	CX-1S-00375-RA		CX-1S-00375-D02	CX-1S-00375-D03
.375 - .395	9.53 - 10.03	CX-1S-00391-RA		CX-1S-00391-D02	CX-1S-00391-D03
.389 - .410	9.88 - 10.41	CX-1S-00406-RA		CX-1S-00406-D02	CX-1S-00406-D03
.405 - .426	10.29 - 10.82	CX-1S-00422-RA		CX-1S-00422-D02	CX-1S-00422-D03
.420 - .441	10.67 - 11.20	CX-1S-00438-RA	CX-1S-00438-D02	CX-1S-00438-D03	
.436 - .457	11.07 - 11.61	CX-1S-00453-RA	CX-1S-00453-D02	CX-1S-00453-D03	
.452 - .473	11.48 - 12.01	CX-1S-00469-RA	CX-1S-00469-D02	CX-1S-00469-D03	
.467 - .488	11.86 - 12.40	CX-1S-00484-RA	CX-1S-00484-D02	CX-1S-00484-D03	
.483 - .504	12.27 - 12.80	CX-1S-00500-RA	CX-1S-00500-D02	CX-1S-00500-D03	
.499 - .520	12.68 - 13.21	CX-1S-00516-RA	CX-1S-00516-D02	CX-1S-00516-D03	
.514 - .535	13.06 - 13.59	CX-1S-00531-RA	CX-1S-00531-D02	CX-1S-00531-D03	
.530 - .551	13.46 - 14.00	CX-1S-00547-RA	CX-1S-00547-D02	CX-1S-00547-D03	
.545 - .566	13.84 - 14.38	CX-1S-00562-RA	R-00750-D14 5 REQUIRED PER SET	CX-1S-00562-D02	CX-1S-00562-D03
.561 - .582	14.25 - 14.78	CX-1S-00578-RA		CX-1S-00578-D02	CX-1S-00578-D03
.577 - .598	14.56 - 15.19	CX-1S-00594-RA		CX-1S-00594-D02	CX-1S-00594-D03
.592 - .613	15.03 - 15.57	CX-1S-00609-RA		CX-1S-00609-D02	CX-1S-00609-D03
.608 - .629	15.44 - 15.98	CX-1S-00625-RA		CX-1S-00625-D02	CX-1S-00625-D03
.624 - .645	15.85 - 16.38	CX-1S-00641-RA		CX-1S-00641-D02	CX-1S-00641-D03
.639 - .660	16.23 - 16.76	CX-1S-00656-RA		CX-1S-00656-D02	CX-1S-00656-D03
.655 - .676	16.64 - 17.17	CX-1S-00672-RA		CX-1S-00672-D02	CX-1S-00672-D03
.671 - .692	17.04 - 17.58	CX-1S-00688-RA		CX-1S-00688-D02	CX-1S-00688-D03
.686 - .707	17.42 - 17.96	CX-1S-00703-RA		CX-1S-00703-D02	CX-1S-00703-D03
.702 - .723	17.83 - 18.36	CX-1S-00719-RA		CX-1S-00719-D02	CX-1S-00719-D03
.717 - .738	18.21 - 18.75	CX-1S-00734-RA		CX-1S-00734-D02	CX-1S-00734-D03
.733 - .754	18.62 - 19.15	CX-1S-00750-RA	CX-1S-00750-D02	CX-1S-00750-D03	

All CX race assemblies are self-feeding: For bottoming applications, replace "1S" with "1B" for RA and cages. Designate rolls a "B".

CX 2000 Machine Race Assemblies

INTERFERENCE-STYLE

INCHES	MM	RACE ASSEMBLY #	ROLL #	RACE #	CAGE #
.749 - .770	19.03 - 19.56	CX-1S-00766-RA	R-00875-D14 5 REQUIRED PER SET	CX-1S-00766-D02	CX-1S-00766-D03
.764 - .785	19.41 - 19.94	CX-1S-00781-RA		CX-1S-00781-D02	CX-1S-00781-D03
.780 - .801	19.81 - 20.35	CX-1S-00797-RA		CX-1S-00797-D02	CX-1S-00797-D03
.795 - .816	20.19 - 20.73	CX-1S-00812-RA		CX-1S-00812-D02	CX-1S-00812-D03
.811 - .832	20.60 - 21.13	CX-1S-00828-RA		CX-1S-00828-D02	CX-1S-00828-D03
.827 - .848	21.01 - 21.54	CX-1S-00844-RA		CX-1S-00844-D02	CX-1S-00844-D03
.842 - .863	21.39 - 21.92	CX-1S-00859-RA		CX-1S-00859-D02	CX-1S-00859-D03
.858 - .879	21.79 - 22.33	CX-1S-00875-RA		CX-1S-00875-D02	CX-1S-00875-D03
.874 - .895	22.20 - 22.73	CX-1S-00891-RA		CX-1S-00891-D02	CX-1S-00891-D03
.889 - .910	22.58 - 23.11	CX-1S-00906-RA		CX-1S-00906-D02	CX-1S-00906-D03
.905 - .926	22.98 - 23.52	CX-1S-00922-RA		CX-1S-00922-D02	CX-1S-00922-D03
.921 - .942	23.39 - 23.93	CX-1S-00938-RA		CX-1S-00938-D02	CX-1S-00938-D03
.936 - .957	23.77 - 24.31	CX-1S-00953-RA		CX-1S-00953-D02	CX-1S-00953-D03
.952 - .973	24.18 - 24.71	CX-1S-00969-RA		CX-1S-00969-D02	CX-1S-00969-D03
.967 - .988	24.56 - 25.10	CX-1S-00984-RA		CX-1S-00984-D02	CX-1S-00984-D03
.983 - 1.004	24.97 - 25.50	CX-1S-01000-RA		CX-1S-01000-D02	CX-1S-01000-D03

All CX race assemblies are self-feeding: For bottoming applications, replace "1S" with "1B" for RA and cages. Designate rolls a "B".

AIR COMPENSATING-STYLE

INCHES	MM	RACE ASSEMBLY #	ROLL #	RACE #	CAGE #
.058 - .070	1.47 - 1.78	CX-1R-00062-RA	R-00500-D14 3 REQUIRED PER SET	CX-1R-00062-D02	CX-1R-00062-D03
.074 - .095	1.88 - 2.41	CX-1R-00078-RA		CX-1R-00078-D02	CX-1R-00078-D03
.090 - .111	2.29 - 2.82	CX-1R-00094-RA		CX-1R-00094-D02	CX-1R-00094-D03
.105 - .126	2.67 - 3.20	CX-1R-00109-RA		CX-1R-00109-D02	CX-1R-00109-D03
.121 - .142	3.07 - 3.61	CX-1R-00125-RA		CX-1R-00125-D02	CX-1R-00125-D03
.137 - .158	3.48 - 4.01	CX-1R-00141-RA		CX-1R-00141-D02	CX-1R-00141-D03
.152 - .173	3.86 - 4.39	CX-1R-00156-RA		CX-1R-00156-D02	CX-1R-00156-D03
.167 - .188	4.24 - 4.78	CX-1R-00171-RA		CX-1R-00171-D02	CX-1R-00171-D03
.183 - .204	4.65 - 5.18	CX-1R-00187-RA		CX-1R-00187-D02	CX-1R-00187-D03
.199 - .220	5.06 - 5.59	CX-1R-00203-RA		CX-1R-00203-D02	CX-1R-00203-D03
.215 - .236	5.46 - 5.99	CX-1R-00219-RA	CX-1R-00219-D02	CX-1R-00219-D03	
.230 - .251	5.84 - 6.38	CX-1R-00234-RA	CX-1R-00234-D02	CX-1R-00234-D03	
.246 - .267	6.25 - 6.78	CX-1R-00250-RA	R-00500-D14 5 REQUIRED PER SET	CX-1R-00250-D02	CX-1R-00250-D03
.262 - .283	6.66 - 7.19	CX-1R-00266-RA		CX-1R-00266-D02	CX-1R-00266-D03
.277 - .298	7.04 - 7.57	CX-1R-00281-RA		CX-1R-00281-D02	CX-1R-00281-D03
.293 - .314	7.44 - 7.98	CX-1R-00297-RA		CX-1R-00297-D02	CX-1R-00297-D03
.308 - .329	7.82 - 8.36	CX-1R-00312-RA		CX-1R-00312-D02	CX-1R-00312-D03
.324 - .345	8.23 - 8.76	CX-1R-00328-RA		CX-1R-00328-D02	CX-1R-00328-D03
.340 - .361	8.64 - 9.17	CX-1R-00344-RA		CX-1R-00344-D02	CX-1R-00344-D03
.355 - .376	9.02 - 9.55	CX-1R-00359-RA		CX-1R-00359-D02	CX-1R-00359-D03
.371 - .392	9.42 - 9.96	CX-1R-00375-RA	CX-1R-00375-D02	CX-1R-00375-D03	

All CX race assemblies are self-feeding: For bottoming applications, replace "1R" with "1RB" for RA and cages. Designate rolls a "B".

CX 2000 Machine Race Assemblies

AIR COMPENSATING-STYLE					
INCHES	MM	RACE ASSEMBLY #	ROLL #	RACE #	CAGE #
.387 - .408	9.83 - 10.36	CX-1R-00391-RA	R-00750-D14 5 REQUIRED PER SET	CX-1R-00391-D02	CX-1R-00391-D03
.402 - .423	10.21 - 10.74	CX-1R-00406-RA		CX-1R-00406-D02	CX-1R-00406-D03
.418 - .437	10.62 - 11.10	CX-1R-00422-RA		CX-1R-00422-D02	CX-1R-00422-D03
.434 - .455	11.02 - 11.56	CX-1R-00438-RA		CX-1R-00438-D02	CX-1R-00438-D03
.449 - .470	11.41 - 11.94	CX-1R-00453-RA		CX-1R-00453-D02	CX-1R-00453-D03
.465 - .486	11.81 - 12.34	CX-1R-00469-RA		CX-1R-00469-D02	CX-1R-00469-D03
.480 - .501	12.19 - 12.73	CX-1R-00484-RA		CX-1R-00484-D02	CX-1R-00484-D03
.496 - .517	12.60 - 13.13	CX-1R-00500-RA		CX-1R-00500-D02	CX-1R-00500-D03
.512 - .533	13.01 - 13.54	CX-1R-00516-RA		CX-1R-00516-D02	CX-1R-00516-D03
.527 - .548	13.39 - 13.92	CX-1R-00531-RA		CX-1R-00531-D02	CX-1R-00531-D03
.543 - .564	13.79 - 14.33	CX-1R-00547-RA		CX-1R-00547-D02	CX-1R-00547-D03
.558 - .579	14.17 - 14.71	CX-1R-00562-RA		CX-1R-00562-D02	CX-1R-00562-D03
.574 - .595	14.58 - 15.11	CX-1R-00578-RA		CX-1R-00578-D02	CX-1R-00578-D03
.590 - .611	14.99 - 15.52	CX-1R-00594-RA		CX-1R-00594-D02	CX-1R-00594-D03
.605 - .626	15.37 - 15.90	CX-1R-00609-RA		CX-1R-00609-D02	CX-1R-00609-D03
.621 - .642	15.55 - 16.31	CX-1R-00625-RA		CX-1R-00625-D02	CX-1R-00625-D03
.637 - .658	16.18 - 16.71	CX-1R-00641-RA		CX-1R-00641-D02	CX-1R-00641-D03
.652 - .673	16.56 - 17.09	CX-1R-00656-RA		CX-1R-00656-D02	CX-1R-00656-D03
.668 - .689	16.97 - 17.50	CX-1R-00672-RA		CX-1R-00672-D02	CX-1R-00672-D03
.684 - .705	17.37 - 17.91	CX-1R-00688-RA		CX-1R-00688-D02	CX-1R-00688-D03
.699 - .720	17.76 - 18.29	CX-1R-00703-RA		CX-1R-00703-D02	CX-1R-00703-D03
.715 - .736	18.16 - 18.69	CX-1R-00719-RA		CX-1R-00719-D02	CX-1R-00719-D03
.730 - .751	18.54 - 19.08	CX-1R-00734-RA		CX-1R-00734-D02	CX-1R-00734-D03
.746 - .767	18.95 - 19.48	CX-1R-00750-RA		CX-1R-00750-D02	CX-1R-00750-D03
.762 - .783	19.36 - 19.89	CX-1R-00766-RA		CX-1R-00766-D02	CX-1R-00766-D03
.777 - .798	19.74 - 20.27	CX-1R-00781-RA	CX-1R-00781-D02	CX-1R-00781-D03	
.793 - .814	20.14 - 20.68	CX-1R-00797-RA	CX-1R-00797-D02	CX-1R-00797-D03	
.808 - .829	20.52 - 21.06	CX-1R-00812-RA	CX-1R-00812-D02	CX-1R-00812-D03	
.824 - .845	20.93 - 21.46	CX-1R-00828-RA	CX-1R-00828-D02	CX-1R-00828-D03	
.840 - .861	21.34 - 21.87	CX-1R-00844-RA	CX-1R-00844-D02	CX-1R-00844-D03	
.855 - .876	21.72 - 22.25	CX-1R-00859-RA	CX-1R-00859-D02	CX-1R-00859-D03	
.871 - .892	22.12 - 22.66	CX-1R-00875-RA	CX-1R-00875-D02	CX-1R-00875-D03	
.887 - .908	22.53 - 23.06	CX-1R-00891-RA	CX-1R-00891-D02	CX-1R-00891-D03	
.902 - .923	22.91 - 23.44	CX-1R-00906-RA	CX-1R-00906-D02	CX-1R-00906-D03	
.918 - .939	23.32 - 23.85	CX-1R-00922-RA	CX-1R-00922-D02	CX-1R-00922-D03	
.934 - .955	23.72 - 24.26	CX-1R-00938-RA	CX-1R-00938-D02	CX-1R-00938-D03	
.949 - .970	24.11 - 24.64	CX-1R-00953-RA	CX-1R-00953-D02	CX-1R-00953-D03	
.965 - .986	24.51 - 25.04	CX-1R-00969-RA	CX-1R-00969-D02	CX-1R-00969-D03	
.980 - 1.001	24.89 - 25.43	CX-1R-00984-RA	CX-1R-00984-D02	CX-1R-00984-D03	
.996 - 1.017	25.30 - 25.83	CX-1R-01000-RA	CX-1R-01000-D02	CX-1R-01000-D03	

All CX race assemblies are self-feeding: For bottoming applications, replace "1R" with "1RB" for RA and cages. Designate rolls a "B".

Diamond burnishing tools

For producing low microinch finishes on shafts or faces of any diameter, or on large bores.

- *Multiple designs allow use on most turning machines, manual or CNC*
- *Replaceable, polished diamond insert*
- *Adjustable for optimum burnishing pressure*



Cogsdill Diamond Burnishing Tools are simple, efficient tools designed to produce mirror-like finishes on a wide range of ferrous and non-ferrous part surfaces on most turning machines.

Set up and cycle times are short, even for unskilled operators. In all cases, the replaceable diamond insert can be changed quickly; on some models without removing the tool holder from the machine.

Multiple tool designs to suit your application requirements:

- **DB-1** For general purpose machining
- **DB-2** For use where work length is restricted
- **DB-3** and **DB-4** For use on CNC machining centers - the tool holders are offset so that the diamond insert is on center
- **SMDBR** and **SMDBS** For small tool envelopes
- **RDB** For boring type applications

The Cogsdill Diamond Burnishing Tool is designed to produce high quality, low microinch burnished finishes on shafts, large bores, and faces. With most metals, a turned or ground part with a properly prepared 40 to 60 microinch finish can be burnished to a 4 to 8 microinch finish in seconds. Cast iron can usually be burnished to an 8 to 15 microinch finish.

Cogsdill Diamond Burnishing Tools can burnish virtually any size stock; from carbon steels to tool steels, cast iron to alloys, and most ferrous and non-ferrous metals. The premium quality diamond burnishing insert is polished and contoured to provide superior finishes and excellent tool life.

Since set up and operation is relatively simple, no special operator skills are required. Diamond Burnishing Tools are versatile . . . various models are designed for use

in the tool post of a manual lathe, automatic, or in CNC equipment. The tools can be used on both large and small diameters, and are ideal for short production runs. The Diamond Burnishing Tool can produce quality finishes on interrupted surfaces, such as a shaft with a keyway or the face of a flange having a series of bolt holes.

While the tool must be used with coolant, no special coolant is required. Straight oils, soluble oils, and synthetic coolants can be used to provide the necessary lubrication.



CNBD1-D04

Replaceable diamond insert is polished and contoured for superior finishes and long tool life.



SMDB-04E

burnishing tools

diamond

How it works

The Cogsdill Diamond Burnishing Tool is mounted in the tool post of the desired machine. The diamond burnishing point is brought into contact with the workpiece at the centerline of the part and perpendicular to the surface being finished. The tool is then fed into the workpiece an additional .002 or .003 inch (.05 or .08mm) to allow the diamond insert to become disengaged from the stop in the holder. The spring, with its preload, forces the diamond against the workpiece. The tool is then fed along the surface of the rotating workpiece to produce a mirrorlike finish.

As a recommended starting point the adjusting screw should be tightened (turn clockwise) until all clearance between the push rod and the spring is removed. Then tighten the screw another 1 to 2 turns which will compress the spring to provide the necessary preload to the diamond insert. This is the

recommended starting point for mild steel. Slight adjustments in the burnishing pressure can be made, if necessary, to achieve the optimum finish. To adjust the burnishing pressure, tighten the adjustment screw to increase pressure or loosen the screw (turn counterclockwise) to reduce the pressure.

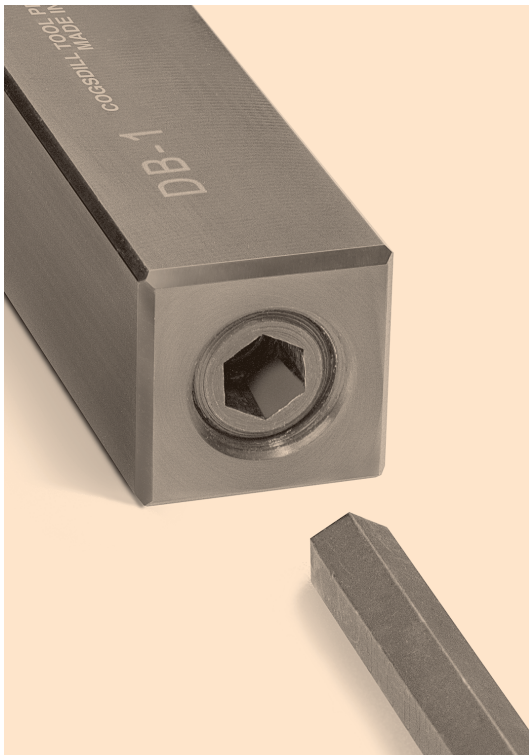
The prefinish on most metals should be approximately 40 to 60 R.M.S. for best results. A feed rate of .003 to .004 inches (.076 to .102mm) per revolution at speeds up to 750 surface feet per minute (229 surface meters per minute) is generally recommended when using the Cogsdill Diamond Burnishing Tool.

Normally, after the tool has been set to provide the .002 to .003 inch (.05 to .08mm) "interference", it can be fed onto the rotating work-piece and allowed to feed off. The slight radius of the diamond tip is sufficient to cause the tool to "climb over" the edge of the part and begin its

burnishing action. Likewise, if an interrupted surface is burnished, such as a shaft with a keyway or a flange with bolt holes, the tip of the tool will drop into the interruption but "climb up" the other edge due to the radius on the diamond.

CAUTION: It is important NOT to exceed the recommended amount of interference. An excessive projection of the diamond insert into any surface interruption could cause tool breakage, as the diamond insert could not perform its "climbing" action. (Note: Adjustment of the burnishing force does not affect the amount of interference.)

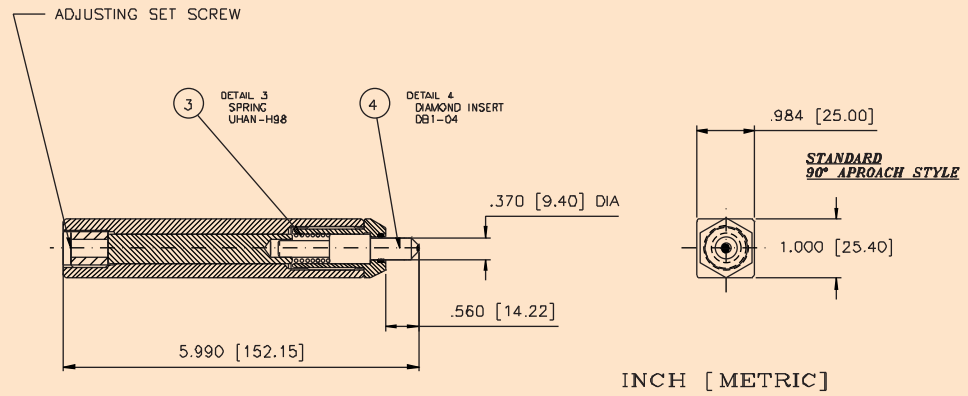
Note: Diamond burnishing tools do not have the advantage of an overlapping effect as with multi-roll tools, and for this reason slower feed rates and/or multiple passes over the part may be required in order to produce the desired finish.



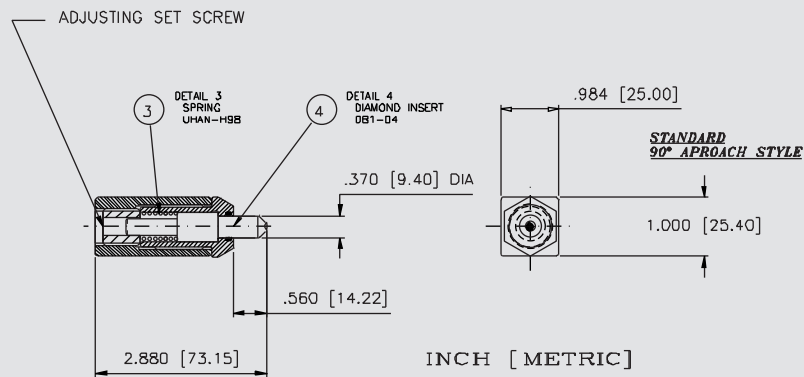
Diamond Burnishing Tools are adjustable for optimum burnishing pressure. For the DB-1 and DB-2 models, the adjustment screw is located in the end of the tool. For models DB-3 and DB-4, the adjustment screw is located on the side of the tool.

Standard tool specifications

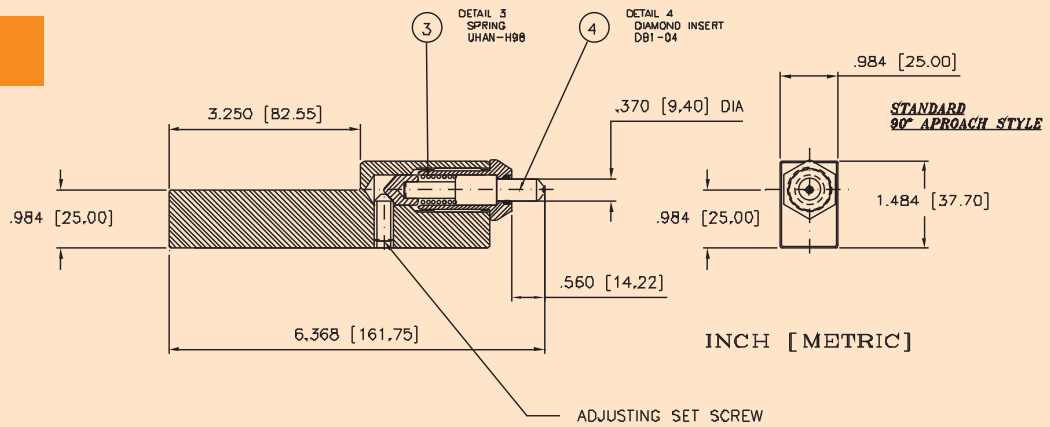
DB-1



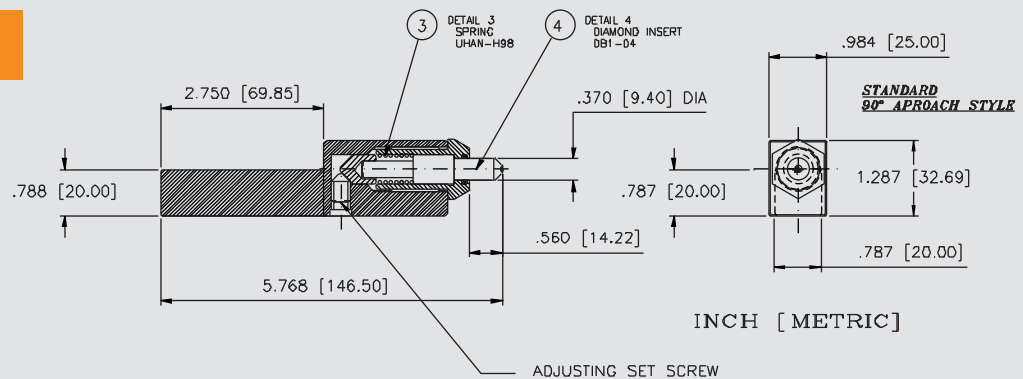
DB-2



DB-3

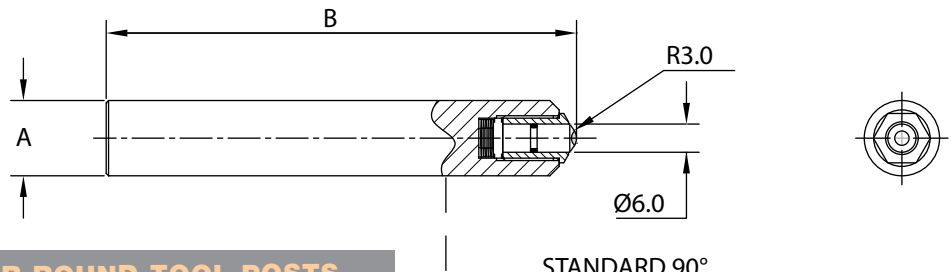


DB-4



Standard tool specifications

SMDBR

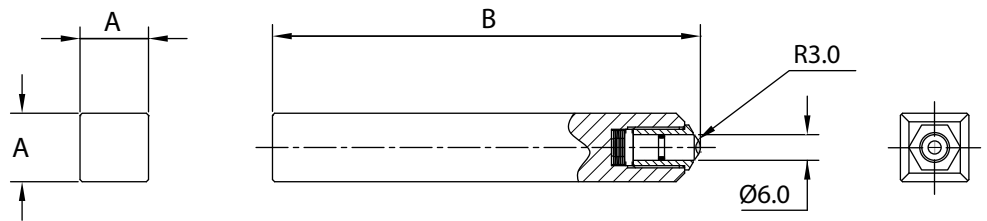


STANDARD 90°
APPROACH STYLE

SMDBR SERIES FOR ROUND TOOL POSTS

DIMENSIONS (MM)			
TOOL#	A	B	DIAMOND NIB
SMDBR-1	12.0	80.0	SMDB-04E
SMDBR-2	16.0	100.0	
SMDBR-3	20.0	125.0	

SMDBS

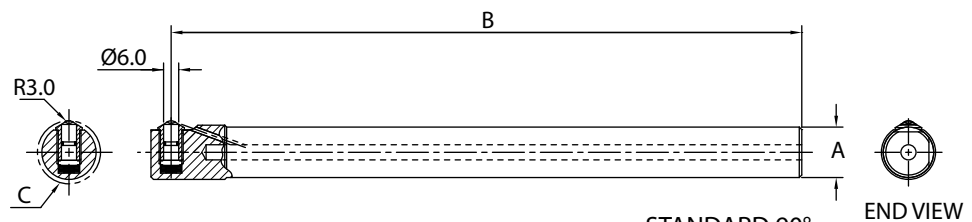


STANDARD 90°
APPROACH STYLE

SMDBS SERIES FOR SQUARE TOOL POSTS

DIMENSIONS (MM)			
TOOL#	A	B	DIAMOND NIB
SMDBS-1	12.0	80.0	SMDB-04E
SMDBS-2	16.0	100.0	
SMDBS-3	20.0	125.0	

RDB



STANDARD 90°
APPROACH STYLE

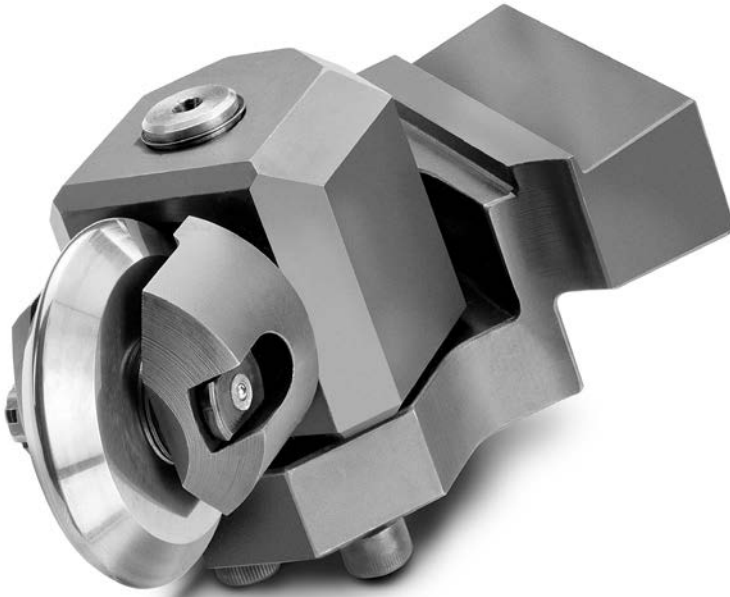
RDB SERIES BORING BAR STYLE

DIMENSIONS (MM)				
TOOL#	A	B	C (Min I.D.)	DIAMOND NIB
RBD-1	11.0	150.0	16.0	RDB1-04
RDB-3	20.0	250.0	25.0	SMDB-04E
RDB-5	32.0	300.0	35.0	

Note: All RDB series tools have a 2.0mm deep flat along shank end.

Universal™ burnishing tools

*For burnishing shafts, faces, tapers, contours,
and relatively large IDs (greater than 2.750
inches/69.85mm)*



UBT-T1 indexable turning-holder style burnishing tool

(Left-hand tool shown)

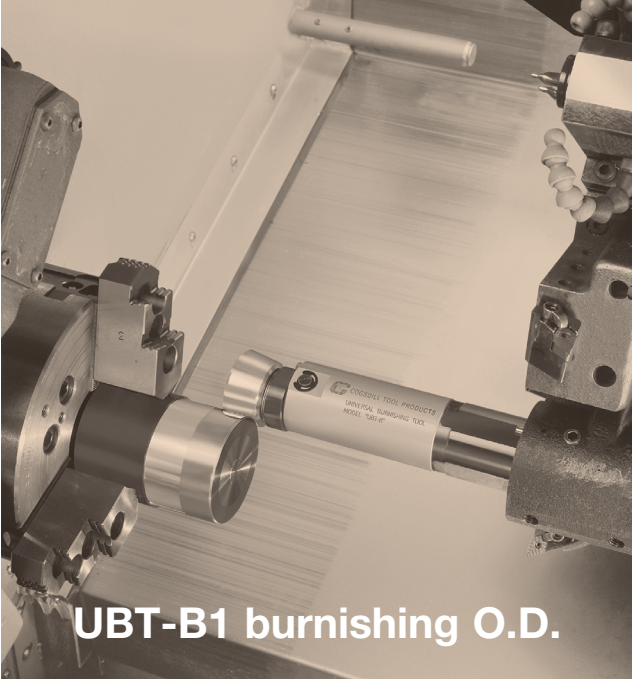
- Boring-bar style and Indexable turning-holder style designs
- Tool designs to suit any part size or configuration, or any turning machine
- Low surface finishes
- Standard, available off-the-shelf
- Adjustable for optimum burnishing pressure
- Hardened steel or carbide rollers



UBT-B1 boring-bar style burnishing tool

Versatility

Burnish any size, any configuration, on any turning machine.



UBT-B1 burnishing O.D.



UBT-B1 burnishing face



UBT-T1 burnishing taper

(Left-hand tool shown)



UBT-T4 turning-holder style

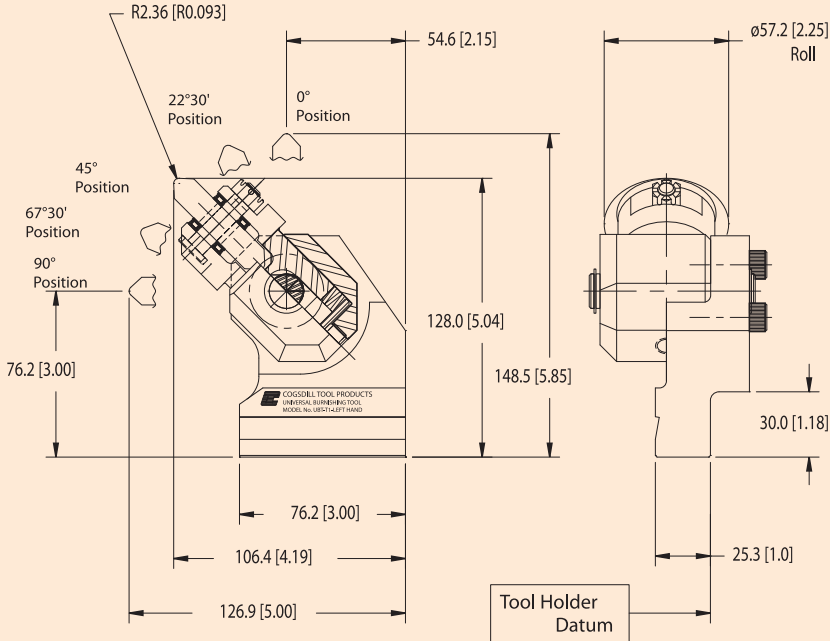
(Left-hand tool shown)

UBT-T Turning-holder style

UBT-T1



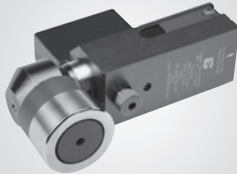
FOR
BURNISHING OUTSIDE
DIAMETERS, FACES,
TAPERS, AND
CONTOURS



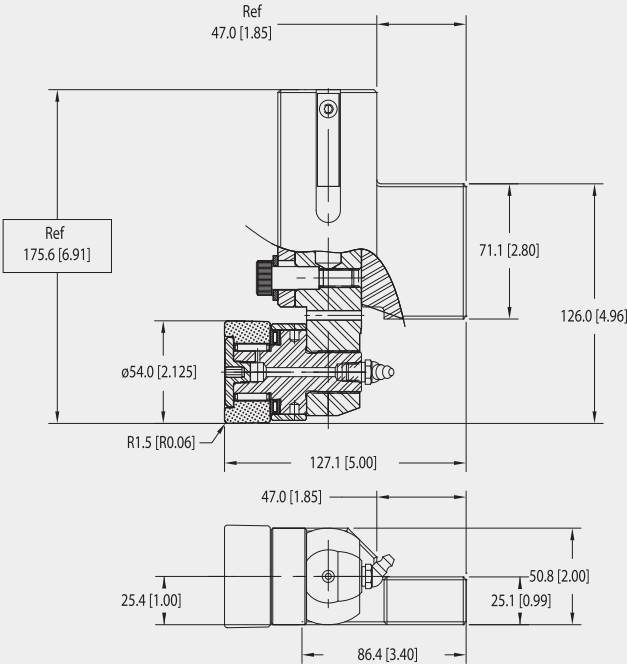
LEFT HAND SHOWN (RIGHT HAND AVAILABLE)

UBT-T1-LH
UBT-T1-RH

UBT-T2



FOR
BURNISHING
OUTSIDE
DIAMETERS

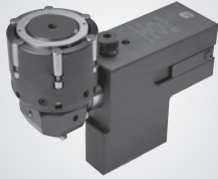


LEFT HAND SHOWN (RIGHT HAND AVAILABLE)

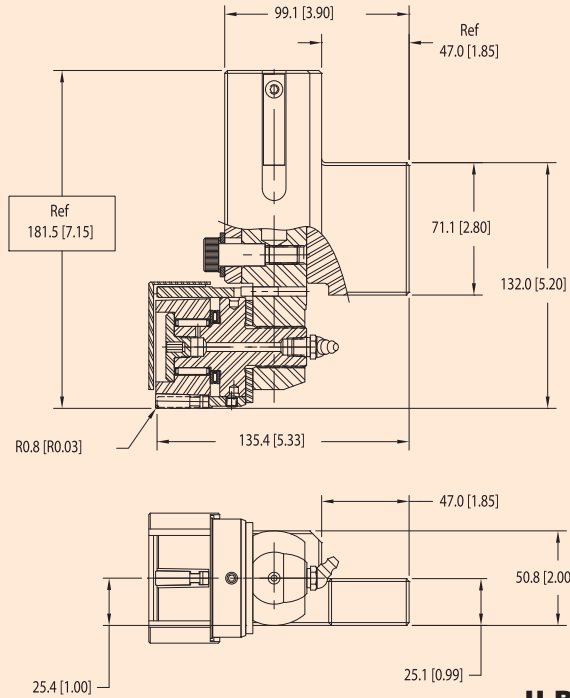
UBT-T2-LH
UBT-T2-RH

UBT-T Turning-holder style

UBT-T3



FOR
BURNISHING LARGE
OUTSIDE DIAMETERS,
(GREATER THAN
100mm/4.00 in.)



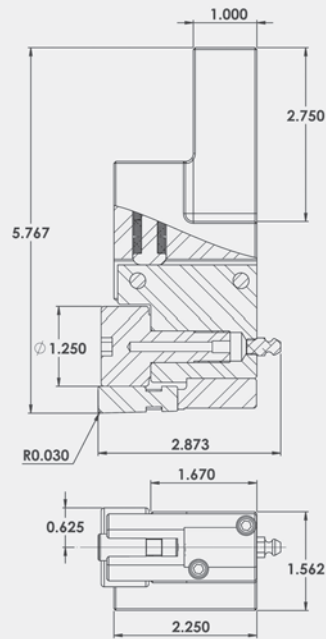
LEFT HAND SHOWN (RIGHT HAND AVAILABLE)

UBT-T3-LH
UBT-T3-RH

UBT-T4



FOR
BURNISHING
WHERE LIMITED
SPACE IS
AVAILABLE



LEFT HAND SHOWN (RIGHT HAND AVAILABLE)

UBT-T4-LH
UBT-T4-RH

Set-up and operating instructions for UBT-T Tools

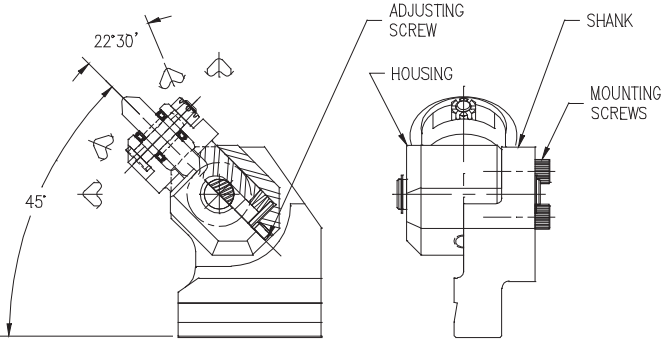
Note: UBT™ single-roll burnishing tools do not have the advantage of an overlapping effect as with multi-roll tools, and for this reason slower feed rates and/or multiple passes over the part may be required in order to produce the desired finish.

UBT-T1 tool set-up

Loosen the load *adjusting screw*. Retighten the *adjusting screw* until it comes into contact with the spring. Continue to tighten screw 1/2 turn past snug. This is a recommended starting point for mild steel.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the *adjusting screw* clockwise one turn to increase the burnishing force, or counterclockwise to reduce the force.

Roll orientation is adjustable in 22°-30' increments. Loosen *mounting screws* two turns. Lift *housing* from *shank*. Rotate to desired position, making sure castellations are engaged. Tighten *mounting screws*.

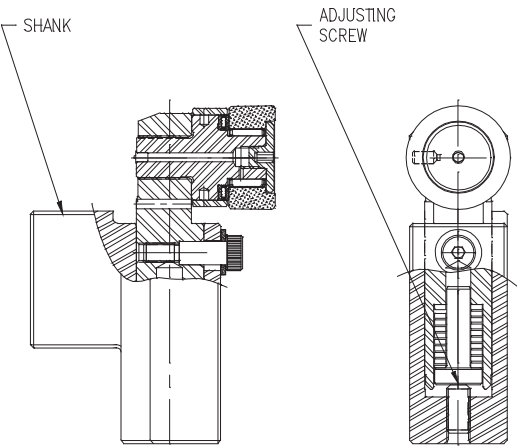


Left hand style shown

UBT-T2 tool set-up

Loosen the load *adjusting screw*. Retighten the *adjusting screw* until it comes into contact with the spring. Continue to tighten screw four turns past snug. This is a recommended starting point for mild steel.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the *adjusting screw* clockwise to increase the burnishing force, six turns total, or counterclockwise to reduce the force.



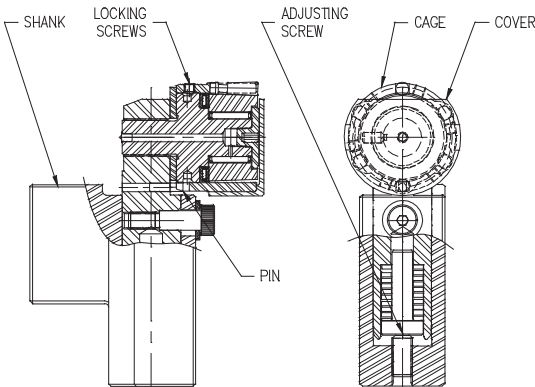
Left hand style shown

UBT-T3 tool set-up

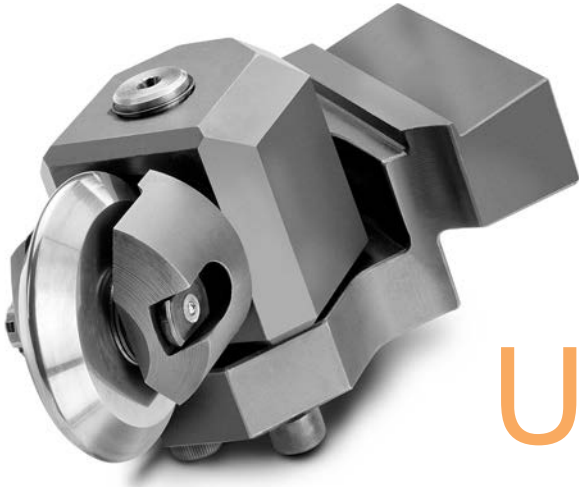
Loosen the load *adjusting screw*. Retighten the *adjusting screw* until it comes into contact with the spring. Continue to tighten screw two turns past snug. This is a recommended starting point for mild steel.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the load *adjusting screw* clockwise to increase the burnishing force, six turns total, or counterclockwise to reduce the force.

To index to a new roll station, pull off *cover*. Loosen *locking screws* and slide *cage* forward approximately 0.157 (4.0mm) until it disengages from *pin*. Rotate *cage* approximately 60°, until *pin* aligns with slot in *cage*, and push back. Tighten *locking screws* and replace *cover* in position shown.



Left hand style shown



UBT-T TOOLS

Set-up and operating instructions for UBT-T tools

UBT-T tool operation

Mount any UBT-T tool in the desired turning station. Use a UBT-T tool that corresponds with the respective turning tool. Bring the tool into contact with the part to be burnished; contact has occurred when you see the mandrel rotating.

Feed the tool another 0.003-0.005 inch (0.08-0.13mm) into the part to provide interference between the

roll and part so that the roll will float in its spring travel. Interference should not be used to increase burnishing force; burnishing force should only be adjusted with the load adjusting screws. This ensures the tool can be fed on/off the part and across interruptions without damage to the tool or workpiece.

For optimum results and long tool

life, coolant is required. Any soluble, synthetic, or straight oil can be used. Whenever possible, and for best results, the tool should be fed towards the spindle when burnishing diameters and towards the centerline when burnishing faces. (Note: UBT-T2 and UBT-T3 tools cannot be used to burnish faces.)

SINGLE-ROLL SERIES			
TURNING HOLDER STYLE (LH/RH = LEFT HAND OR RIGHT HAND TOOL ORIENTATION)			
TOOL #	ROLL (STANDARD)	OPTIONAL HSS ROLLS	OPTIONAL CARBIDE ROLLS
UBT-T1-LH	UBT-006 (HSS .093 Radius)	STANDARD .093 HSS (LH & RH)	UBT-010 (.093 Radius)
UBT-T1-RH		UBT-007 (.030 Radius)	UBT-011 (.030 Radius)
		UBT-008 (.060 Radius)	UBT-012 (.060 Radius)
		UBT-009 (.120 Radius)	UBT-013 (.120 Radius)
UBT-T2-LH	UBT-015 (.060 Radius)	N/A	UBT-016 (.060 Radius)
UBT-T2-RH			
UBT-T3-LH	6100-708-00312 (.030 Radius)	N/A	
UBT-T3-RH			

UBT-T1, T2, & T3 series tooling have a 1.00" shank. Optional roll and/or 25mm shank must be specified. Force gages available for UBT-T2 & UBT-T3 series only. Contact Cogsdill for additional information. Special tooling and rolls available upon request. Please contact Cogsdill for additional information.

Speed and feed recommendations for UBT-T tools

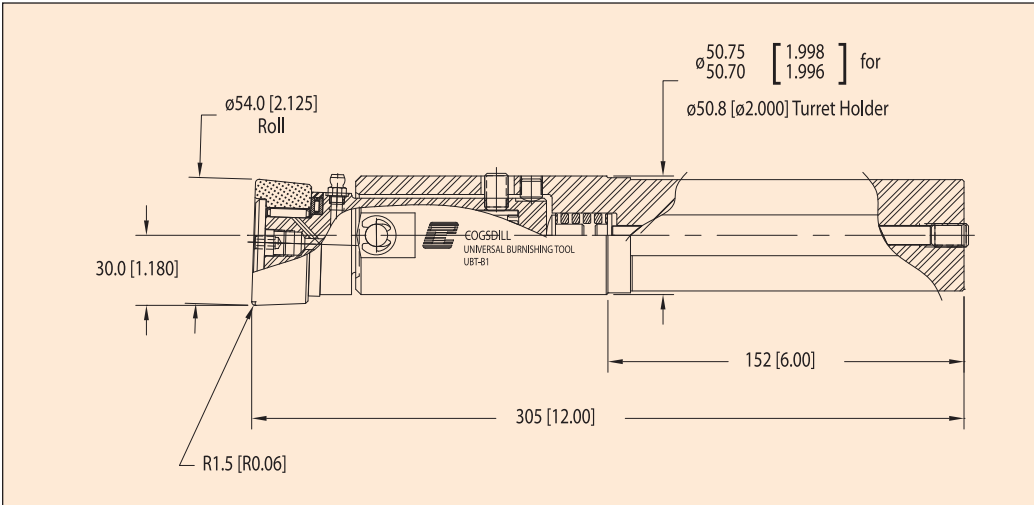
SPEED	
SFM	M/MIN.
750	230

FEED	
IPR	MM/REV.
0.001/0.006	0.02/0.15

Lubrication of UBT-T tools

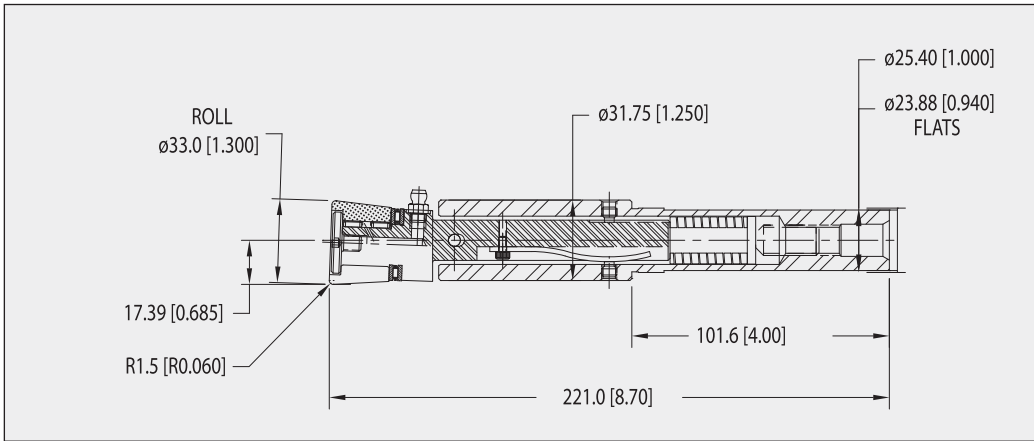
All UBT-T tools should be periodically greased (approximately every 24 hours of operation). We recommend the use of high-quality Lithium complex grease.

UBT-B Boring-bar style



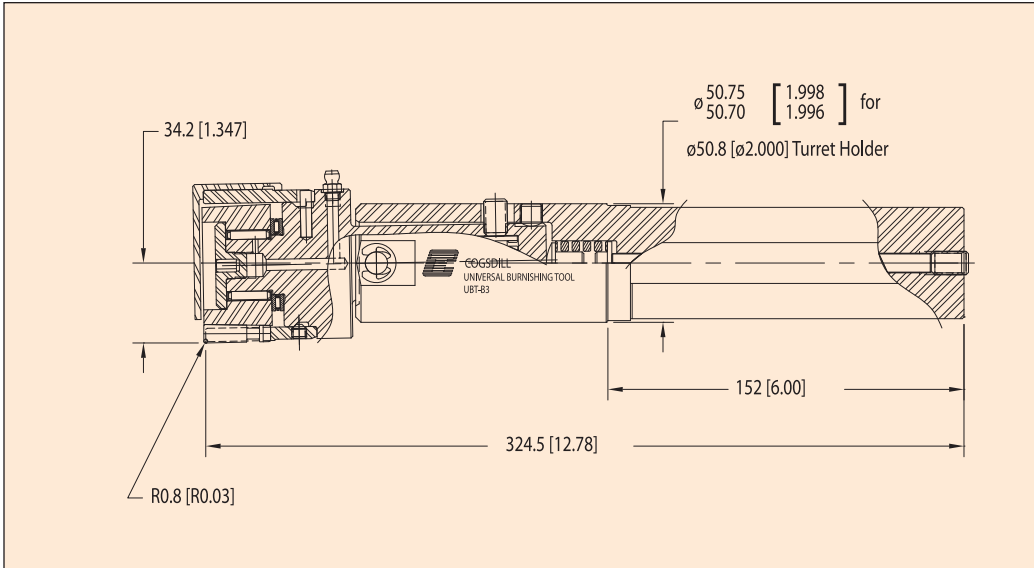
UBT-B1

FOR BURNISHING
OUTSIDE DIAMETERS,
FACES, AND LARGE INSIDE
DIAMETERS (ID'S GREATER
THAN 70mm/2.75 in.)



UBT-B2

A SMALLER VERSION
OF THE UBT-B1
(ID'S GREATER THAN
39.6mm/1.56 in.)



UBT-B3

FOR USE IN SMALLER INSIDE
DIAMETERS (IDS GREATER
THAN 70MM/2.75 in.) OR ON
LARGE OUTSIDE DIAMETERS
(GREATER THAN
100mm/4.00in.)

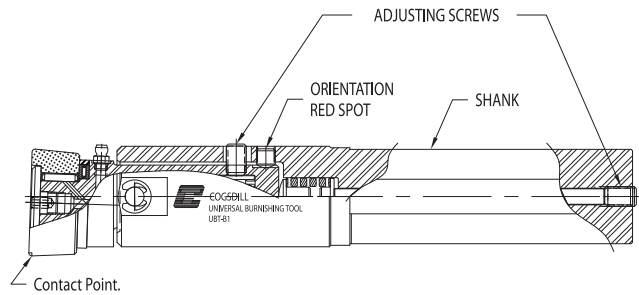
Set-up and operating instructions for UBT-B Tools

Note: UBT™ single-roll burnishing tools do not have the advantage of an overlapping effect as with multi-roll tools, and for this reason slower feed rates and/or multiple passes over the part may be required in order to produce the desired finish.

UBT-B1 tool set-up

Loosen the load *adjusting screws*. Retighten the *adjusting screws* until they come into contact with the spring. Continue to tighten both screws one turn past snug. This is a recommended starting point for mild steel.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the *adjusting screws* clockwise to increase the burnishing force, three turns total, or counterclockwise to reduce the force.

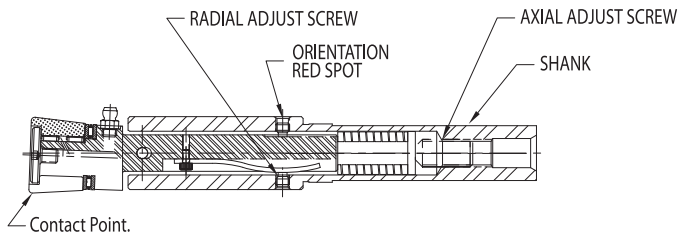


UBT-B2 tool set-up

Loosen the load *adjusting screws*. Retighten the *axial adjusting screw* until it comes into contact with the spring. Continue to tighten three turns past snug. This is a recommended starting point for mild steel.

Tighten the *radial adjusting screw* until it comes into contact with the spring. Continue to tighten 1-1/2 turns past snug. Do not tighten beyond this point; overloading this screw will not allow the tool to float on its spring travel and will impede tool function.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the *axial adjusting screw* only. Turn clockwise to increase burnishing force, for a total of 6-1/2 turns, or counterclockwise to reduce the force.

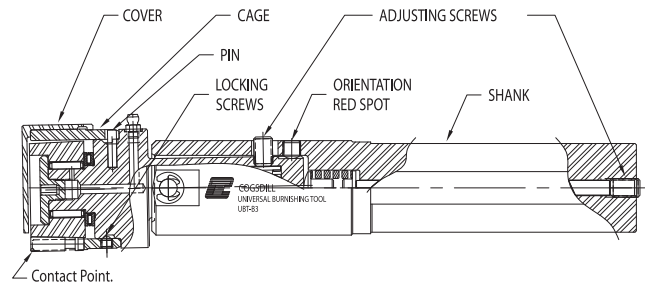


UBT-B3 tool set-up

Loosen the load *adjusting screws*. Retighten the *adjusting screws* until they come into contact with the spring. Continue to tighten both screws one turn past snug. This is a recommended starting point for mild steel.

Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the *adjusting screws* clockwise to increase the burnishing force, for a total of three turns, or counterclockwise to reduce the force.

To index to a new roll station, pull off *cover*. Loosen *locking screws* and slide *cage* forward approximately 0.157 (4.0mm) until it disengages from *pin*. Rotate *cage* approximately 60°, until *pin* aligns with slot in *cage*, and push back. Tighten *locking screws* and replace *cover* in position, exposed *roll* opposite orientation red spot.





UBT-B TOOLS

Set-up and operating instructions for UBT-B tools

UBT-B tool operation

Mount any UBT-B tool in the desired boring bar station. (Note: The red orientation spot *must* be opposite the contact point.) Bring the tool into contact with the part to be burnished.

Feed the tool another 0.003-0.005 inch (0.08-0.13mm) into the part to provide interference between the roll and part so that the roll will float

in its spring travel. Interference should not be used to increase burnishing force; burnishing force should only be adjusted with the load adjusting screws. This ensures the tool can be fed on/off the part and across interruptions without damage to the tool or workpiece.

For optimum results and long tool life, coolant is required. Any soluble,

synthetic, or straight oil can be used. Whenever possible, and for best results, the tool should be fed towards the spindle when burnishing diameters and towards the centerline when burnishing faces. (Note: the UBT-B3 tool cannot be used to burnish faces.)

BORING BAR STYLE			
TOOL #	ROLL (STANDARD)	OPTIONAL HSS ROLLS	OPTIONAL CARBIDE ROLLS
UBT-B1	UBT-001 (HSS .060 Radius)	STANDARD .060 HSS	UBT-002 (.060 Radius)
		UBT-003 (.030 Radius)	UBT-004 (.030 Radius)
UBT-B2	UBT-018N (HSS .060 Radius)	STANDARD .060 HSS	UBT-019N (.060 Radius)
UBT-B3	6100-708-00312 (.030 Radius)	N/A	

UBT-B1 & UBT-B3 tools have a 2.00" shank. optional roll and/or 50mm shank must be specified.

UBT-B2 tools have a 1.00" shank. optional roll and/or 25mm shank must be specified.

Special tooling and rolls available upon request. please contact Cogsdill for additional information.

Speed and feed recommendations for UBT-B tools

SPEED	
SFM	M/MIN.
750	230

FEED	
IPR	MM/REV.
0.001/0.006	0.02/0.15

Lubrication of UBT-B tools

All UBT-B tools should be periodically greased (approximately every 24 hours of operation). We recommend the use of high-quality Lithium complex grease.

Worthless scrap or precision part? The KB “Scrap-Saver” process can make the difference. Cogsdill’s KB process is an innovative approach to making the diameter of holes smaller and the diameter of shafts larger. The KB process was originally developed for automotive parts rebuilding industries, where out-of-tolerance bores and shafts on parts that were formerly scrapped are salvaged with the KB process. The process is also applied in original equipment manufacturing.

Cogsdill has offered the KB process for many years, and we have salvaged thousands of parts for many customers with this process. Typically, standard burnishing tools are used and knurling tools are offered as required. If you have an interest in exploring how this process might work for your application, please contact your Cogsdill regional manager or call our customer service team for more information. Salvage out-of-tolerance bores or shafts with the two-step KB[®] Knurling-Burnishing “scrap saver” process.



Roll-a-Finish tool

KB knurling tool

Note: KB knurling tool shown above without adjusting screw.

The KB process

KB is Superior to Conventional Salvage Methods

Conventional salvage methods, including spray welding and chrome plating, are expensive, time-consuming, and often produce unsatisfactory results. These metal-adding processes do not deposit a uniform thickness around the circumference of the hole or shaft; they also deposit metal where it is not wanted, and remachining is required. Often remachining is difficult because no qualified surfaces are available for alignment.

Another approach is to cut away additional metal and install a bushing or sleeve. Additional time and effort is required for machining and finishing the part to bring it within tolerance.

The KB Process eliminates these problems in two quick steps through the use of two tools. The KB Knurling Tool raises the surface of the oversize bore (or undersize shaft). The Roll-a-

Finish Tool roller burnishes the knurled surface to the exact diameter required. (See below, “How It Works.”) The entire two-step process can be accomplished in seconds

Improved surface characteristics and lower cost

In addition to the benefits of Knurling/Burnishing as a sizing and salvage method, the process results in a series of plateaus on the same plane in the surface of the metal, thus providing increased contact area. Tests by a major auto manufacturer have shown increases in surface holding power of up to 35% over surfaces which are precision bored to receive press-fit bearings. In many cases the finished boring process may be eliminated altogether. The grooves in the Knurled/Burnished surface are ideally suited for use with an adhesive

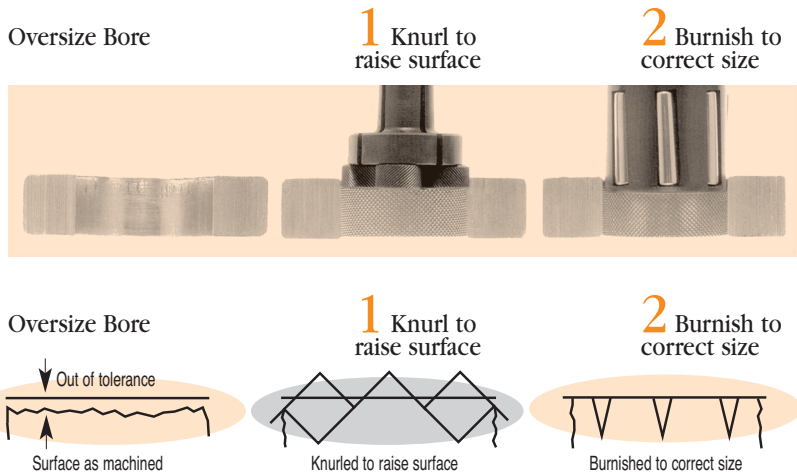
agent. The grooves are also desirable for the effect of trapping and funneling away foreign matter and grit that might otherwise remain on the bearing surface of the part.

For running fits, the increased contact area diminishes the load carried at any given point on the part surface; this increases the ability of the surface to resist wear. Knurling, like Roller Burnishing, is a metal displacement process, and the work-hardening effect of the tools also contributes to the ability of the Knurled/Burnished surface to resist wear.

The KB Process can result in cost savings in several areas. Machine time can be reduced as much as 10:1. Substantial reductions are achieved in tool cost and tool inventory. Fewer machines and less floor space are required.

Knurling and Burnishing makes holding size easier; this results in savings in inspection time and scrap.

How it works



An oversize bore may be machined out-of-tolerance or made oversize by excessive wear. Here’s how the KB Process can salvage this part:

- 1 — A Cogsdill KB Knurling Tool displaces material on the oversize hole diameter, raising the surface as much as .030 inch (.76mm) in a diamond-shaped knurled pattern. The bore is now undersize.
- 2 — A Cogsdill Roll-a-Finish Tool cold works the knurled surface, burnishing the hole to correct size.



COGSDILL TOOL

products, inc.

Application data sheet Roller burnishing tools



PLEASE PHOTOCOPY & COMPLETE THIS FORM & ENCLOSE WITH YOUR ORDER OR REQUEST FOR QUOTATION. THE DATA WILL BE USED TO ENSURE THAT THE CORRECT TOOL IS FURNISHED FOR YOUR PARTICULAR APPLICATION.

CUSTOMER _____ DATE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CONTACT _____ TELEPHONE _____

FAX _____ E-MAIL ADDRESS _____

TITLE _____

SALES AGENT _____ SALESMAN _____

CUSTOMER'S PART _____

PRINTS INCLUDED YES _____ NO _____ LATER _____

PRIMARY OBJECTIVE SIZE _____ FINISH _____ OTHER _____

THROUGH-HOLE OR BLIND BORE? _____

FINISH DIAMETER(S) _____ TOLERANCE(S) _____

SURFACE FINISH REQUIRED _____ in Ra

WHAT IS THE OPERATION PRIOR TO BURNISHING? _____

PRESIZE(S) _____ TOLERANCE(S) _____

PREFINISH _____ in Ra

LENGTH OF BURNISH _____ MATERIAL _____

MATERIAL CONDITION (HARDNESS OR TENSILE STRENGTH) _____

TYPE OF MACHINE TO BE USED _____ TYPE SHANK _____

EXTERNAL OR INTERNAL COOLANT? _____

IS THE TOOL TO BE RUN HORIZONTALLY OR VERTICALLY? _____

AUTOMATIC TOOL CHANGER? YES _____ NO _____

WEIGHT RESTRICTION _____

TOOL LENGTH RESTRICTION _____

ARE THERE RESTRICTIONS ON DIAMETER OR LENGTH? (FIXTURE INTERFERENCE, SHOULDER, GROOVE, KEYWAY, ETC.) _____

PRODUCTION REQUIREMENT _____

ADDITIONAL COMMENTS _____

Fax or mail to:

FAX (803) 438-5263
Cogsdill Tool Products, Inc.
P.O. Box 7007
Camden, SC 29021
ATTN: CUSTOMER SERVICE

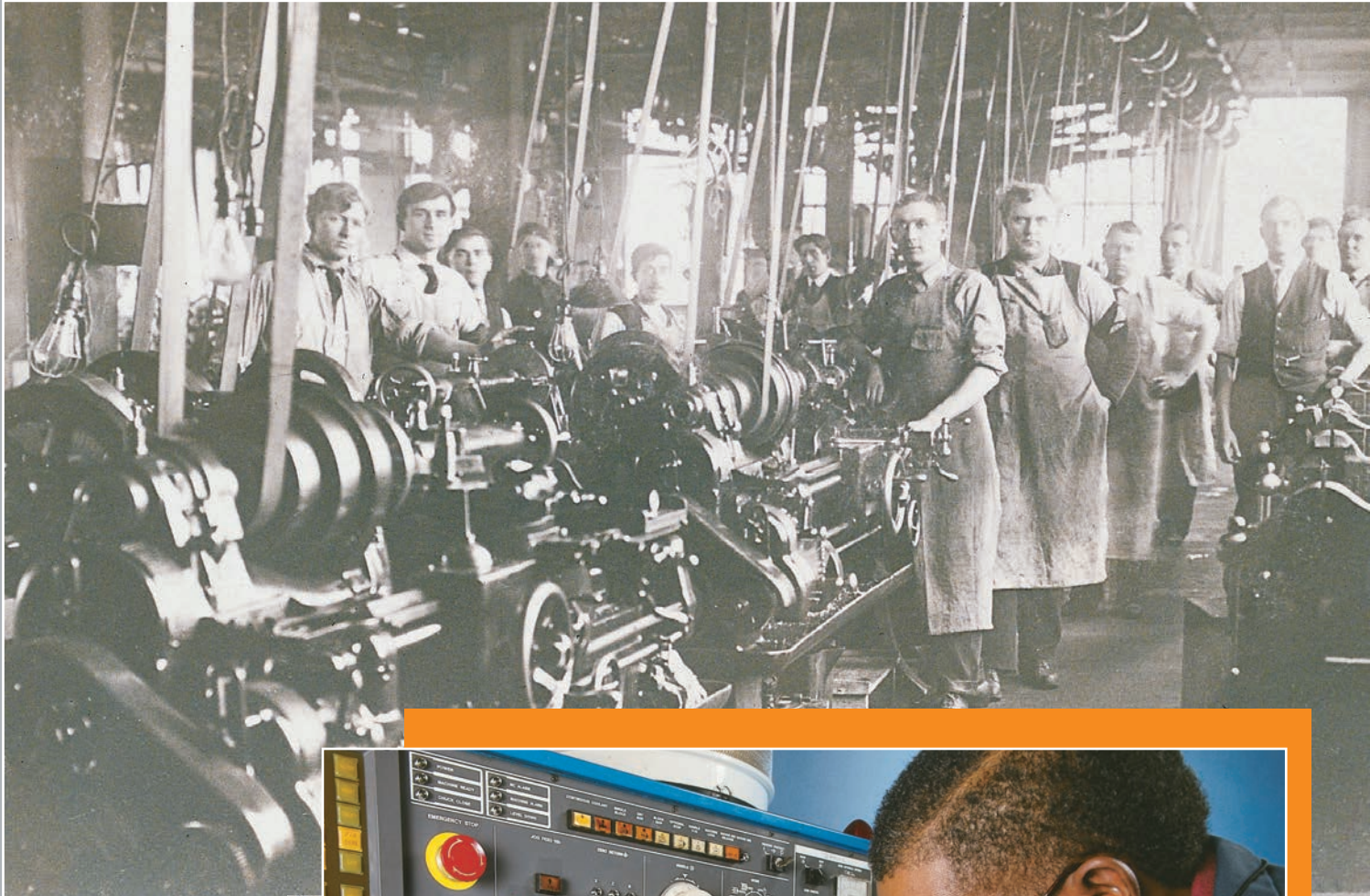
IMPORTANT

PART PRINT OR DETAILED SKETCH MUST BE SUPPLIED.

COGSDILL

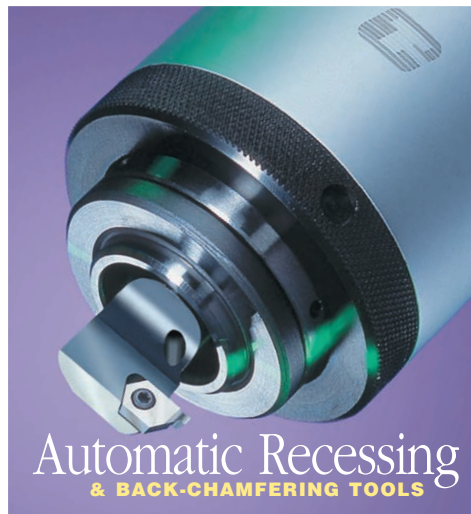
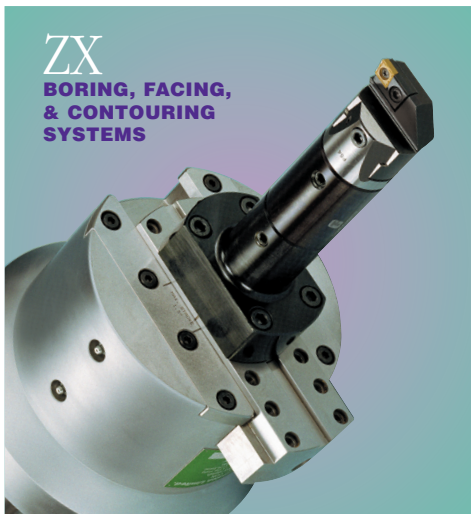
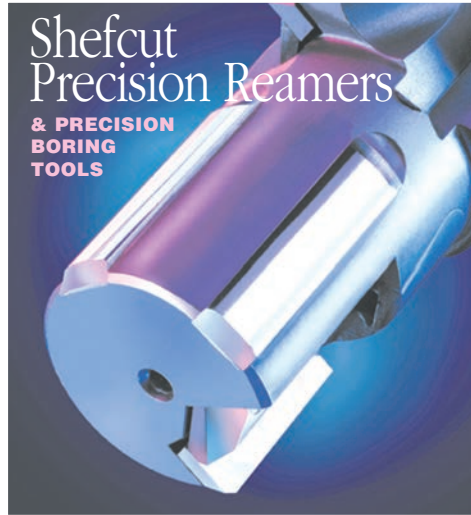
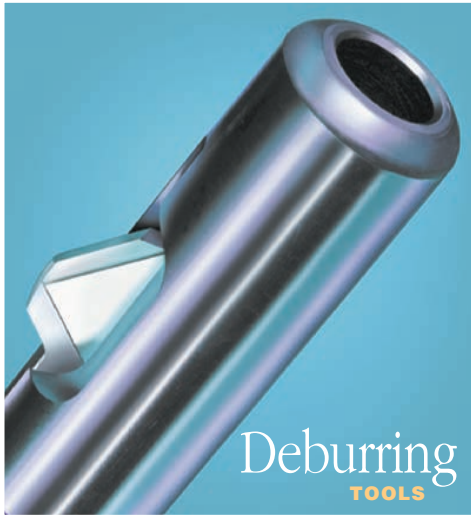
toolmakers

since 1914



visit our web site at

→ www.cogsdill.com



COGSDILL TOOL PRODUCTS, INC.

Mailing Address

P.O. Box 7007
Camden, SC USA 29021-7007
Ph. (803) 438-4000
Fax (803) 438-5263
www.cogsdill.com
cogsdill@cogsdill.com

Shipping Address

1001 Guion Drive
Lugoff, SC 29078

COGSDILL-NUNEATON LIMITED

St George's Way
Bermuda Industrial Estate
Nuneaton, Warwickshire, CV10 7JS, UK
Ph. +44 (0) 2476 383792
Fax +44 (0) 2476 344433
www.cogsdill.co.uk
sales@cogsdill.co.uk

FOR ADDITIONAL INFORMATION



Visit us online

www.cogsdill.com

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