

Burnishing

Burnishing TOOLS & MACHINES

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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 microns, with surface finishes as fine as 0.05 micrometers (2 microinches)... *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



CX™ External Roller Burnishing Machines



External Roll-a-Finish Tools



Internal Roll-a-Finish™ Tools

*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 **s o l u t i o n s** to meet your sizing and finishing needs, with faster production and at a lower cost.*

COGSDILL-NUNEATON LTD.

Diamond Burnishing Tools



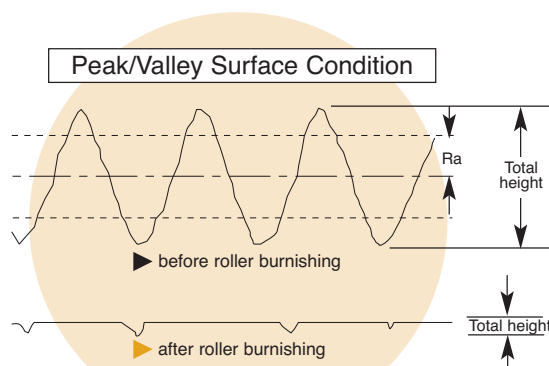
Burnishing products shown here are *not* to scale.

Roller burnishing overview

➔ **Roller burnishing is a surface finishing technique in which hardened, highly polished steel rollers are brought into pressure contact with a softer piece part.** As the pressure generated through the rollers exceeds the yield point of the piece-part 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 0.05 to 0.1 micrometers (2 to 4 microinches) (Ra)
- 2 Improved size control – tolerances within .01mm (.0005 inch) 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
diamond
tools

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 4,00 to 50,00mm (.157 to 1.968 inch). The tools are easily adjustable over a typical range of 1,00mm (.040 inch). 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
- ***The KB Knurling-Burnishing Process***, for salvaging out-of-tolerance bores and shafts: a two-step process using Cogsdill knurling tools and Roll-a-Finish tools

Knurling-Burnishing Process
KB

universal
burnishing
tools

bearingizing
tools



Internal Roll-a-Finish™ tools

SRMR/SRMB series

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) as standard.
- Through-hole style with helix cage (self-feeding), made to order.
- Bottoming-style for blind hole, with no-helix cage (machine-feeding) as standard.



Through-Hole
(No Helix)



Through-Hole
(Helix)



Bottoming
(No Helix)

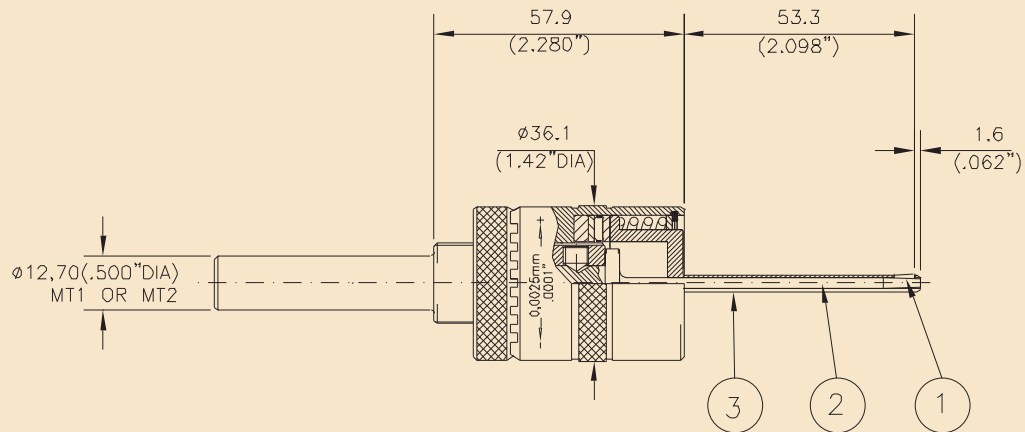
... with up to *three work lengths*:

- SRMR (B)
- SRMR (B)+50mm
- SRMR (B)+100mm
- Longer lengths available on request.

... and *available from stock*:

- for hole sizes from 4,00 to 50,00 mm (.157 to 1.968 inches).
- Tools are adjustable in increments of .002mm (.0001 inch).

Standard tool specifications



MAIN SPARES

1. ROLLS (3/TOOL)
2. MANDREL CONE
3. CAGE

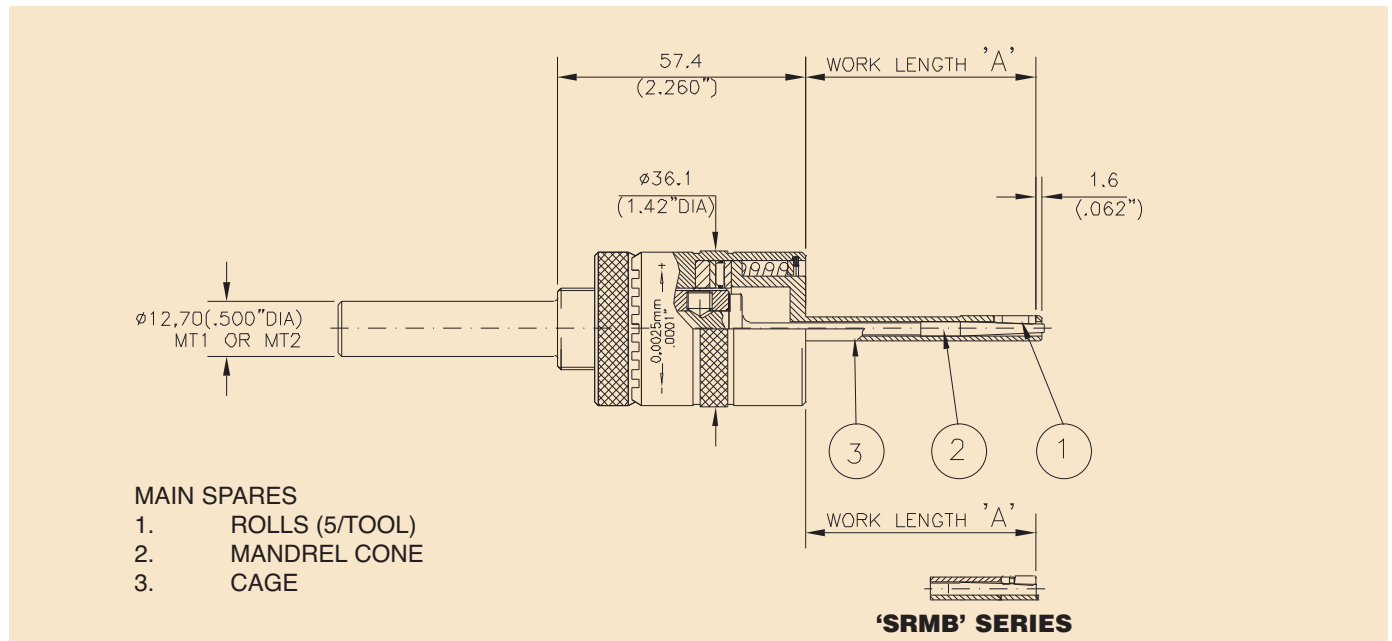
SRMR SERIES ROLL-A-FINISH™ TOOLS

4,0 to 5,75mm (.157" to .226")

DIAMETER RANGE				TOOL NUMBER		
MIN		MAX		THRO-HOLE	BOTTOMING	SELF-FEED OPTION
mm	Inches	mm	Inches	(No Helix)	(No Helix)	(1 1/2° Helix)
3,97	.156	4,25	.167	SRMR 4	-	-
4,22	.166	4,50	.177	SRMR 4,25	-	-
4,47	.176	4,75	.187	SRMR 4,50	-	-
4,72	.186	5,00	.197	SRMR 4,75	-	-
4,97	.196	5,25	.207	SRMR 5	-	Thro-Hole only
5,22	.206	5,50	.217	SRMR 5,25	-	Thro-Hole only
5,47	.215	5,75	.226	SRMR 5,50	-	Thro-Hole only
5,72	.225	6,00	.236	SRMR 5,75	-	Thro-Hole only

Tools other than shown above are available upon request.

Standard tool specifications



SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

6,0 to 12,5mm (.236" to .492")

DIAMETER RANGE				TOOL NUMBER			
MIN		MAX		Standard Length 'A' = 53.3mm (2.098")		Extended Length 'A' = 104.1mm (4.098")	
				THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
mm	Inches	mm	Inches				
5,95	.234	6,50	.256	SRMR 6	SRMB 6	SRMR 6 + 50	SRMB 6 + 50
6,45	.254	7,00	.276	SRMR 6,50	SRMB 6,50	SRMR 6,50 + 50	SRMB 6,50 + 50
6,95	.274	7,50	.295	SRMR 7	SRMB 7	SRMR 7 + 50	SRMB 7 + 50
7,45	.293	8,00	.315	SRMR 7,50	SRMB 7,50	SRMR 7,50 + 50	SRMB 7,50 + 50
7,95	.313	8,50	.335	SRMR 8	SRMB 8	SRMR 8 + 50	SRMB 8 + 50
8,45	.333	9,00	.354	SRMR 8,50	SRMB 8,50	SRMR 8,50 + 50	SRMB 8,50 + 50
8,95	.352	9,50	.374	SRMR 9	SRMB 9	SRMR 9 + 50	SRMB 9 + 50
9,45	.372	10,00	.394	SRMR 9,50	SRMB 9,50	SRMR 9,50 + 50	SRMB 9,50 + 50
9,95	.392	10,50	.413	SRMR 10	SRMB 10	SRMR 10 + 50	SRMB 10 + 50
10,45	.411	11,00	.433	SRMR 10,50	SRMB 10,50	SRMR 10,50 + 50	SRMB 10,50 + 50

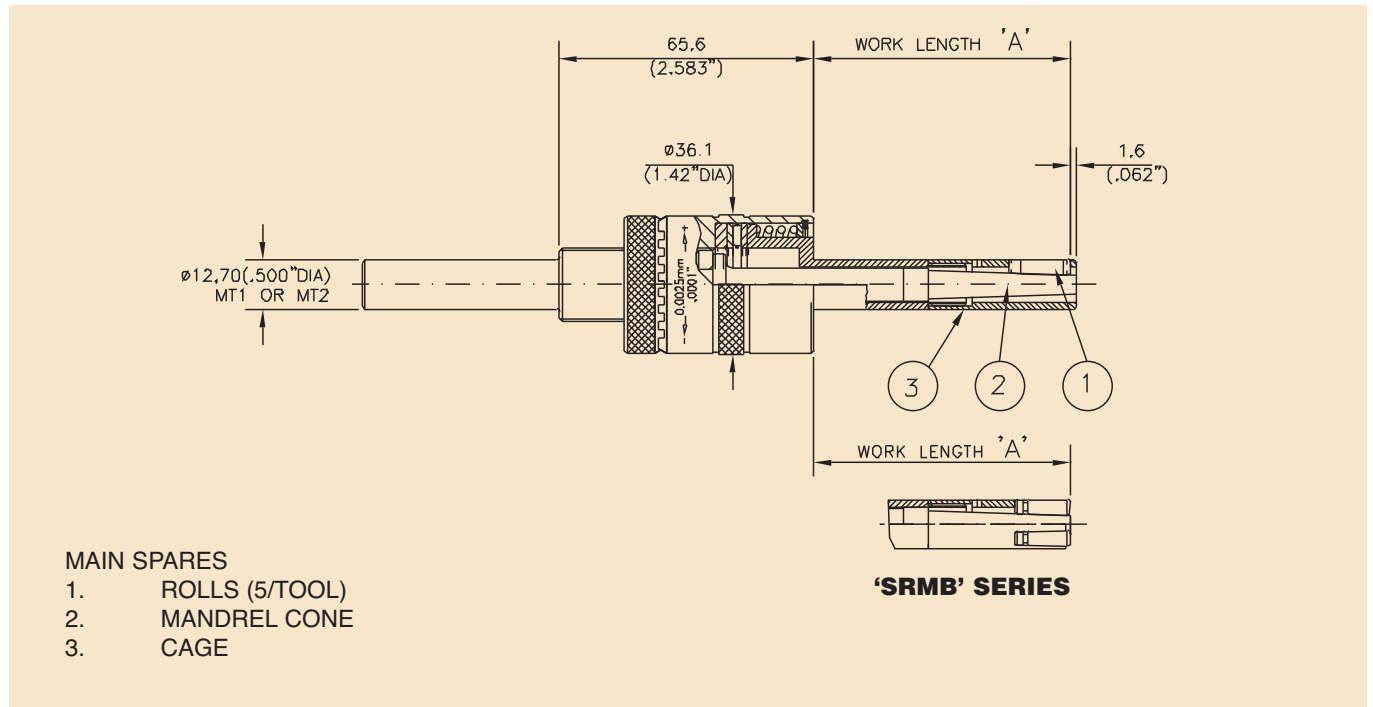
Optional Self-Feeding 1 1/2° Helix Style Tools are Available for all Sizes, Styles and Lengths in this Range.

DIAMETER RANGE				TOOL NUMBER					
MIN		MAX		Standard Length 'A' = 66.3mm (2.610")		Extended Length 'A' = 117.1mm (4.610")		Extra Length 'A' = 167.9mm (6.610")	
				THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
mm	Inches	mm	Inches						
10,95	.431	11,50	.453	SRMR 11	SRMB 11	SRMR 11 + 50	SRMB 11 + 50	SRMR 11 + 100	SRMB 11 + 100
11,45	.451	12,00	.472	SRMR 11,50	SRMB 11,50	SRMR 11,50 + 50	SRMB 11,50 + 50	SRMR 11,50 + 100	SRMB 11,50 + 100
11,95	.470	12,50	.492	SRMR 12	SRMB 12	SRMR 12 + 50	SRMB 12 + 50	SRMR 12 + 100	SRMB 12 + 100
12,45	.490	13,00	.512	SRMR 12,50	SRMB 12,50	SRMR 12,50 + 50	SRMB 12,50 + 50	SRMR 12,50 + 100	SRMB 12,50 + 100

Optional Self-Feeding 1 1/2° Helix Style Tools are Available for all Sizes, Styles and Lengths in this Range

*When ordering Blind Bore Tools please state actual size to be burnished.
Tools other than shown above are available upon request.*

Standard tool specifications



SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

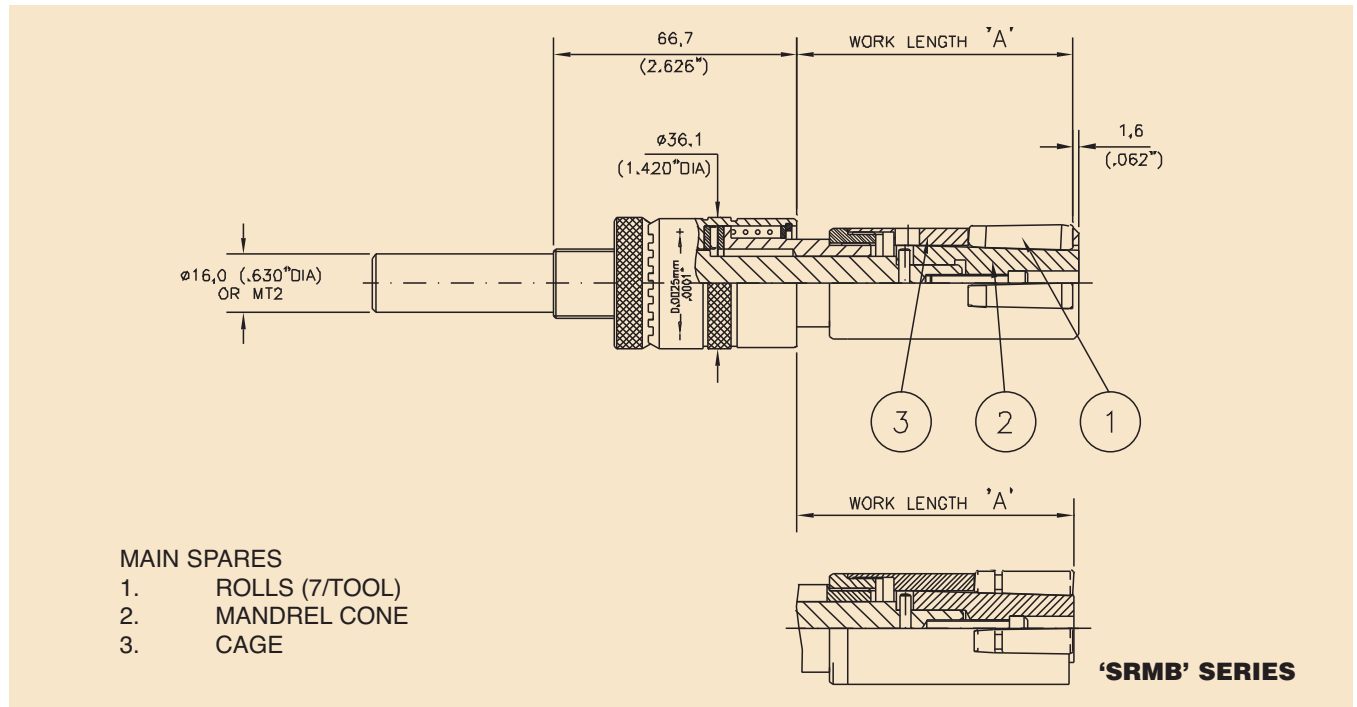
13,0 to 24,0mm (.512" to .945")

DIAMETER RANGE				TOOL NUMBER					
MIN		MAX		Standard Length 'A' = 66.3mm (2.610")		Extended Length 'A' = 117.1mm (4.610")		Extra Length 'A' = 167.9mm (6.610")	
				THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
mm	Inches	mm	Inches						
12,90	.508	14,00	.551	SRMR 13	SRMB 13	SRMR 13 + 50	SRMB 13 + 50	SRMR 13 + 100	SRMB 13 + 100
13,90	.547	15,00	.591	SRMR 14	SRMB 14	SRMR 14 + 50	SRMB 14 + 50	SRMR 14 + 100	SRMB 14 + 100
14,90	.587	16,00	.630	SRMR 15	SRMB 15	SRMR 15 + 50	SRMB 15 + 50	SRMR 15 + 100	SRMB 15 + 100
15,90	.626	17,00	.669	SRMR 16	SRMB 16	SRMR 16 + 50	SRMB 16 + 50	SRMR 16 + 100	SRMB 16 + 100
16,90	.665	18,00	.709	SRMR 17	SRMB 17	SRMR 17 + 50	SRMB 17 + 50	SRMR 17 + 100	SRMB 17 + 100
17,90	.705	19,00	.748	SRMR 18	SRMB 18	SRMR 18 + 50	SRMB 18 + 50	SRMR 18 + 100	SRMB 18 + 100
18,90	.744	20,00	.787	SRMR 19	SRMB 19	SRMR 19 + 50	SRMB 19 + 50	SRMR 19 + 100	SRMB 19 + 100
19,90	.783	21,00	.827	SRMR 20	SRMB 20	SRMR 20 + 50	SRMB 20 + 50	SRMR 20 + 100	SRMB 20 + 100
20,90	.823	22,00	.866	SRMR 21	SRMB 21	SRMR 21 + 50	SRMB 21 + 50	SRMR 21 + 100	SRMB 21 + 100
21,90	.862	23,00	.906	SRMR 22	SRMB 22	SRMR 22 + 50	SRMB 22 + 50	SRMR 22 + 100	SRMB 22 + 100
22,90	.902	24,00	.945	SRMR23	SRMB 23	SRMR 23 + 50	SRMB 23 + 50	SRMR 23 + 100	SRMB 23 + 100
23,90	.941	25,00	.984	SRMR 24	SRMB 24	SRMR 24 + 50	SRMB 24 + 50	SRMR 24 + 100	SRMB 24 + 100

Optional Self-Feeding 1/2° Helix Style Tools are Available for all Sizes, Styles and Lengths in this Range

*When ordering Blind Bore Tools please state actual size to be burnished.
Tools other than shown above are available upon request.*

Standard tool specifications



SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

25,0 to 50,0mm (.984" to 1.969")

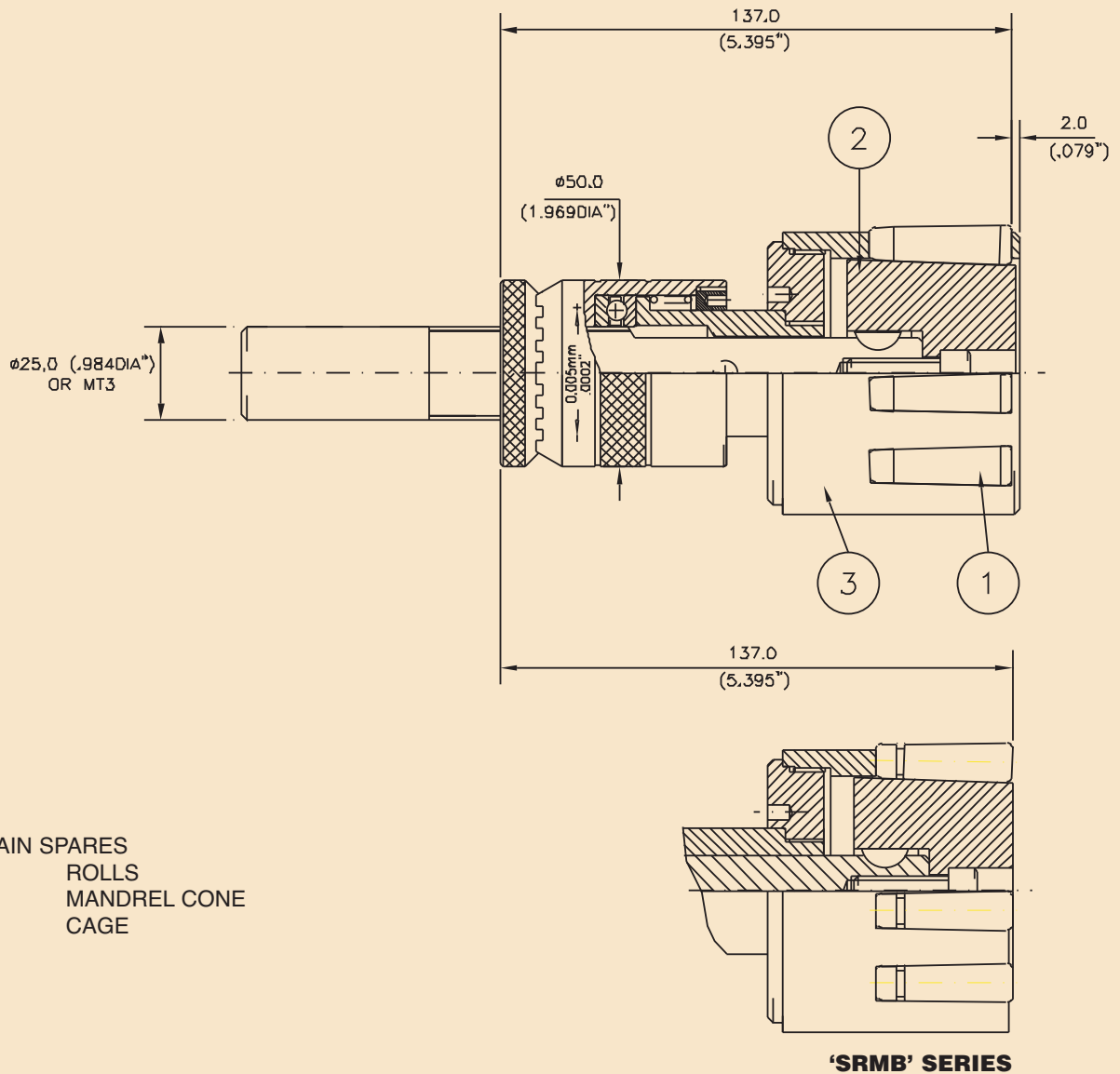
DIAMETER RANGE				TOOL NUMBER					
MIN		MAX		Standard Length 'A' = 75,7mm (2.980")		Extended Length 'A' = 126,5mm (4.980")		Extra Length 'A' = 177,3mm (6.980")	
mm	Inches	mm	Inches	THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
24,90	.980	26,00	1.024	SRMR 25	SRMB 25	SRMR 25 + 50	SRMB 25 + 50	SRMR 25 + 100	SRMB 25 + 100
25,90	1.020	27,00	1.063	SRMR 26	SRMB 26	SRMR 26 + 50	SRMB 26 + 50	SRMR 26 + 100	SRMB 26 + 100
26,90	1.059	28,00	1.102	SRMR 27	SRMB 27	SRMR 27 + 50	SRMB 27 + 50	SRMR 27 + 100	SRMB 27 + 100
27,90	1.098	29,00	1.142	SRMR 28	SRMB 28	SRMR 28 + 50	SRMB 28 + 50	SRMR 28 + 100	SRMB 28 + 100
28,90	1.138	30,00	1.181	SRMR 29	SRMB 29	SRMR 29 + 50	SRMB 29 + 50	SRMR 29 + 100	SRMB 29 + 100
29,90	1.177	31,00	1.220	SRMR 30	SRMB 30	SRMR 30 + 50	SRMB 30 + 50	SRMR 30 + 100	SRMB 30 + 100
30,90	1.217	32,00	1.260	SRMR 31	SRMB 31	SRMR 31 + 50	SRMB 31 + 50	SRMR 31 + 100	SRMB 31 + 100
31,90	1.256	33,00	1.300	SRMR 32	SRMB 32	SRMR 32 + 50	SRMB 32 + 50	SRMR 32 + 100	SRMB 32 + 100
32,90	1.295	34,00	1.339	SRMR 33	SRMB 33	SRMR 33 + 50	SRMB 33 + 50	SRMR 33 + 100	SRMB 33 + 100
33,90	1.335	35,00	1.378	SRMR 34	SRMB 34	SRMR 34 + 50	SRMB 34 + 50	SRMR 34 + 100	SRMB 34 + 100
34,90	1.374	36,00	1.417	SRMR 35	SRMB 35	SRMR 35 + 50	SRMB 35 + 50	SRMR 35 + 100	SRMB 35 + 100
35,90	1.413	37,00	1.457	SRMR 36	SRMB 36	SRMR 36 + 50	SRMB 36 + 50	SRMR 36 + 100	SRMB 36 + 100
36,90	1.453	38,00	1.496	SRMR 37	SRMB 37				
37,90	1.492	39,00	1.535	SRMR 38	SRMB 38				
38,90	1.531	40,00	1.574	SRMR 39	SRMB 39				
39,90	1.571	41,00	1.614	SRMR 40	SRMB 40				
40,90	1.610	42,00	1.654	SRMR 41	SRMB 41				
41,90	1.649	43,00	1.693	SRMR 42	SRMB 42				
42,90	1.689	44,00	1.732	SRMR 43	SRMB 43				
43,90	1.728	45,00	1.772	SRMR 44	SRMB 44				
44,90	1.768	46,00	1.811	SRMR 45	SRMB 45				
45,90	1.807	47,00	1.850	SRMR 46	SRMB 46				
46,90	1.846	48,00	1.890	SRMR 47	SRMB 47				
47,90	1.886	49,00	1.929	SRMR 48	SRMB 48				
48,90	1.925	50,00	1.968	SRMR 49	SRMB 49				
49,90	1.964	51,00	2.008	SRMR 50	SRMB 50				

ON COMPONENT BORES MORE THAN 36MM, INFINITE LENGTHS CAN BE BURNISHED BY ADDING SHANK ADAPTORS

Optional Self-Feeding 1½° Helix Style Tools are Available for all Sizes, Styles and Lengths in this Range

*When ordering Blind Bore Tools please state actual size to be burnished.
Tools other than shown above are available upon request.*

Standard tool specifications



SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

51,0 to 89,0mm (2.008" to 3.504")

SEE NEXT PAGE FOR CHART

Standard tool specifications

SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

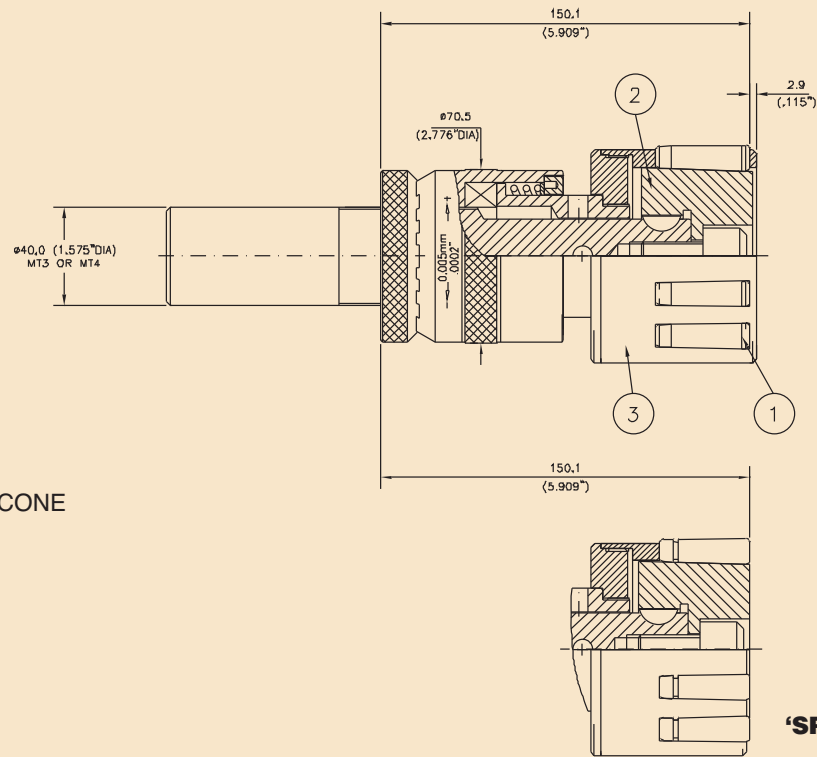
51,0 to 89,0mm (2.008" to 3.504")

DIAMETER RANGE				TOOL NUMBER	
MIN		MAX		(UNLIMITED WORKING LENGTH USING SHANK EXTENSIONS)	
				THRO-HOLE (No Helix)	BOTTOMING (No Helix)
mm	Inches	mm	Inches		
50,90	2.004	52,00	2.047	SRMR 51	SRMB 51
51,90	2.043	53,00	2.087	SRMR 52	SRMB 52
52,90	2.083	54,00	2.126	SRMR 53	SRMB 53
53,90	2.122	55,00	2.165	SRMR 54	SRMB 54
54,90	2.161	56,00	2.205	SRMR 55	SRMB 55
55,90	2.201	57,00	2.244	SRMR 56	SRMB 56
56,90	2.240	58,00	2.283	SRMR 57	SRMB 57
57,90	2.280	59,00	2.323	SRMR 58	SRMB 58
58,90	2.319	60,00	2.362	SRMR 59	SRMB 59
59,90	2.358	61,00	2.402	SRMR 60	SRMB 60
60,90	2.398	62,00	2.441	SRMR 61	SRMB 61
61,90	2.437	63,00	2.480	SRMR 62	SRMB 62
62,90	2.476	64,00	2.520	SRMR 63	SRMB 63
63,90	2.516	65,00	2.559	SRMR 64	SRMB 64
64,90	2.555	66,00	2.598	SRMR 65	SRMB 65
65,90	2.594	67,00	2.638	SRMR 66	SRMB 66
66,90	2.634	68,00	2.677	SRMR 67	SRMB 67
67,90	2.673	69,00	2.717	SRMR 68	SRMB 68
68,90	2.713	70,00	2.756	SRMR 69	SRMB 69
69,90	2.752	71,00	2.795	SRMR 70	SRMB 70
70,90	2.791	72,00	2.835	SRMR 71	SRMB 71
71,90	2.831	73,00	2.874	SRMR 72	SRMB 72
72,90	2.870	74,00	2.913	SRMR 73	SRMB 73
73,90	2.909	75,00	2.953	SRMR 74	SRMR 74
74,90	2.949	76,00	2.992	SRMR 75	SRMB 75
75,90	2.988	77,00	3.031	SRMR 76	SRMB 76
76,90	3.028	78,00	3.071	SRMR 77	SRMB 77
77,90	3.067	79,00	3.110	SRMR 78	SRMB 78
78,90	3.106	80,00	3.150	SRMR 79	SRMB 79
79,90	3.146	81,00	3.189	SRMR 80	SRMB 80
80,90	3.185	82,00	3.228	SRMR 81	SRMB 81
81,90	3.224	83,00	3.268	SRMR 82	SRMB 82
82,90	3.264	84,00	3.307	SRMR 83	SRMB 83
83,90	3.303	85,00	3.346	SRMR 84	SRMB 84
84,90	3.343	86,00	3.386	SRMR 85	SRMB 85
85,90	3.382	87,00	3.425	SRMR 86	SRMB 86
86,90	3.421	88,00	3.465	SRMR 87	SRMB 87
87,90	3.461	89,00	3.504	SRMR 88	SRMB 88
88,90	3.500	90,00	3.543	SRMR 89	SRMB 89
Optional Self-Feeding 1½° Helix Style Tools are Available for all Sizes and Styles in this Range					

Standard tool specifications

MAIN SPARES

1. ROLLS
2. MANDREL CONE
3. CAGE



'SRMB' SERIES

SRMR/SRMB SERIES ROLL-A-FINISH™ TOOLS

90,0 to 177,0 mm (3.543" to 6.969")

DIAMETER RANGE				TOOL NUMBER	
MIN		MAX		(UNLIMITED WORKING LENGTH USING SHANK EXTENSIONS)	
mm	Inches	mm	Inches	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
89,90	3.539	91,00	3.583	SRMR 90	SRMB 90
90,90	3.579	92,00	3.622	SRMR 91	SRMB 91
91,90	3.618	93,00	3.661	SRMR 92	SRMB 92
92,90	3.657	94,00	3.701	SRMR 93	SRMB 93
93,90	3.697	95,00	3.740	SRMR 94	SRMB 94
94,90	3.736	96,00	3.780	SRMR 95	SRMB 95
95,90	3.776	97,00	3.819	SRMR 96	SRMB 96
96,90	3.815	98,00	3.858	SRMR 97	SRMB 97
97,90	3.854	99,00	3.898	SRMR 98	SRMB 98
98,90	3.894	100,00	3.937	SRMR 99	SRMB 99
99,90	3.933	101,00	3.976	SRMR 100	SRMB 100
100,90	3.972	102,00	4.016	SRMR 101	SRMB 101
101,90	4.012	103,00	4.055	SRMR 102	SRMB 102
102,90	4.052	104,00	4.094	SRMR 103	SRMB 103
103,90	4.091	105,00	4.134	SRMR 104	SRMB 104
104,90	4.130	106,00	4.173	SRMR 105	SRMB 105
105,90	4.169	107,00	4.213	SRMR 106	SRMB 106
106,90	4.209	108,00	4.252	SRMR 107	SRMB 107
107,90	4.248	109,00	4.291	SRMR 108	SRMB 108
108,90	4.287	110,00	4.331	SRMR 109	SRMB 109
109,90	4.327	111,00	4.370	SRMR 110	SRMB 110
110,90	4.366	112,00	4.409	SRMR 111	SRMB 111
111,90	4.406	113,00	4.449	SRMR 112	SRMB 112
112,90	4.445	114,00	4.488	SRMR 113	SRMB 113

Optional Self-Feeding 1 1/2° Helix Style Tools are Available for all Sizes and Styles in this Range

*When ordering Blind Bore Tools please state actual size to be burnished.
Tools other than shown above are available upon request.*

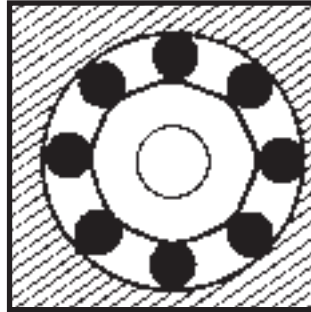
DIAMETER RANGE				TOOL NUMBER	
MIN		MAX		(UNLIMITED WORKING LENGTH USING SHANK EXTENSIONS)	
mm	Inches	mm	Inches	THRO-HOLE (No Helix)	BOTTOMING (No Helix)
113,90	4.484	115,00	4.528	SRMR 114	SRMB 114
114,90	4.524	116,00	4.567	SRMR 115	SRMB 115
115,90	4.563	117,00	4.606	SRMR 116	SRMB 116
116,90	4.602	118,00	4.646	SRMR 117	SRMB 117
117,90	4.642	119,00	4.685	SRMR 118	SRMB 118
118,90	4.681	120,00	4.724	SRMR 119	SRMB 119
119,90	4.720	121,00	4.764	SRMR 120	SRMB 120
120,90	4.760	122,00	4.803	SRMR 121	SRMB 121
121,90	4.799	123,00	4.843	SRMR 122	SRMB 122
122,90	4.839	124,00	4.882	SRMR 123	SRMB 123
123,90	4.878	125,00	4.921	SRMR 124	SRMB 124
124,90	4.917	126,00	4.961	SRMR 125	SRMB 125
125,90	4.957	127,00	5.000	SRMR 126	SRMB 126
126,90	4.996	128,00	5.039	SRMR 127	SRMB 127
127,90	5.035	129,00	5.079	SRMR 128	SRMB 128
128,90	5.075	130,00	5.118	SRMR 129	SRMB 129
129,90	5.114	131,00	5.157	SRMR 130	SRMB 130
130,90	5.154	132,00	5.197	SRMR 131	SRMB 131
131,90	5.193	133,00	5.236	SRMR 132	SRMB 132
132,90	5.232	134,00	5.276	SRMR 133	SRMB 133
133,90	5.272	135,00	5.315	SRMR 134	SRMB 134
134,90	5.311	136,00	5.354	SRMR 135	SRMB 135
135,90	5.350	137,00	5.394	SRMR 136	SRMB 136
136,90	5.390	138,00	5.433	SRMR 137	SRMB 137
137,90	5.429	139,00	5.472	SRMR 138	SRMB 138
138,90	5.469	140,00	5.512	SRMR 139	SRMB 139
139,90	5.508	141,00	5.551	SRMR 140	SRMB 140
140,90	5.547	142,00	5.591	SRMR 141	SRMB 141
141,90	5.587	143,00	5.630	SRMR 142	SRMB 142
142,90	5.626	144,00	5.669	SRMR 143	SRMB 143
143,90	5.665	145,00	5.709	SRMR 144	SRMB 144
144,90	5.705	146,00	5.748	SRMR 145	SRMB 145
145,90	5.744	147,00	5.787	SRMR 146	SRMB 146
146,90	5.783	148,00	5.827	SRMR 147	SRMB 147
147,90	5.823	149,00	5.866	SRMR 148	SRMB 148
148,90	5.862	150,00	5.906	SRMR 149	SRMB 149
149,90	5.902	151,00	5.945	SRMR 150	SRMB 150
150,90	5.941	152,00	5.984	SRMR 151	SRMB 151
151,90	5.980	153,00	6.024	SRMR 152	SRMB 152
152,90	6.020	154,00	6.063	SRMR 153	SRMB 153
153,90	6.059	155,00	6.102	SRMR 154	SRMB 154
154,90	6.098	156,00	6.142	SRMR 155	SRMB 155
155,90	6.138	157,00	6.181	SRMR 156	SRMB 156
156,90	6.177	158,00	6.220	SRMR 157	SRMB 157
157,90	6.217	159,00	6.260	SRMR 158	SRMB 158
158,90	6.256	160,00	6.299	SRMR 159	SRMB 159
159,90	6.295	161,00	6.339	SRMR 160	SRMB 160
160,90	6.335	162,00	6.378	SRMR 161	SRMB 161
161,90	6.374	163,00	6.417	SRMR 162	SRMB 162
162,90	6.413	164,00	6.457	SRMR 163	SRMB 163
163,90	6.453	165,00	6.496	SRMR 164	SRMB 164
164,90	6.492	166,00	6.535	SRMR 165	SRMB 165
165,90	6.531	167,00	6.575	SRMR 166	SRMB 166
166,90	6.571	168,00	6.614	SRMR 167	SRMB 167
167,90	6.610	169,00	6.654	SRMR 168	SRMB 168
168,90	6.650	170,00	6.693	SRMR 169	SRMB 169
169,90	6.690	171,00	6.732	SRMR 170	SRMB 170
170,90	6.728	172,00	6.772	SRMR 171	SRMB 171
171,90	6.768	173,00	6.811	SRMR 172	SRMB 172
172,90	6.807	174,00	6.850	SRMR 173	SRMB 173
173,90	6.846	175,00	6.890	SRMR 174	SRMB 174
174,90	6.886	176,00	6.929	SRMR 175	SRMB 175
175,90	6.925	177,00	6.969	SRMR 176	SRMB 176
176,90	6.965	178,00	7.008	SRMR 177	SRMB 177

Optional Self-Feeding 1 $\frac{1}{2}$ ° Helix Style Tools are Available for all Sizes and Styles in this Range

ROLLS

INTERNAL ROLLER BURNISHING ROLL CHART				
TOOL NUMBER		ROLL NUMBER		QTY / TOOL
(FROM	- TO)	THRO-HOLE	BOTTOMING	
SRM 4	- 4,75	RR137	-	3
SRM 5	- 5,75	SR187	-	3
SRMR 6	- 7,50	R250	B250	5
SRMR 8	- 9	R312	B312	5
SRMR 9,50	- 10,50	R375	B375	5
SRMR 11	- 12,50	R437	B437	5
SRMR 13	- 17	R500	B500	5
SRMR 18	- 24	R750	B750	5
SRMR 25	- 29	R750	B750	7
SRMR 30	- 35	R875	B875	7
SRMR 36	- 41	R1125	B1125	7
SRMR 42	- 50	R1625	B1625	7
SRMR 51	- 69	R1625	B1625	9
SRMR 70	- 89	R1625	B1625	11
SRMR 90	- 110	R1625	B1625	13
SRMR 111	- 135	R1625	B1625	15
SRMR 136	- 155	R1625	B1625	17
SRMR 156	- 177	R1625	B1625	19

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 $\pm .002\text{mm}$ (.0001 inch), while the Roll-a-Finish tool can achieve tolerances of $\pm .006\text{mm}$ (.00025 inch).

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 1.01mm (.040 inch), 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.

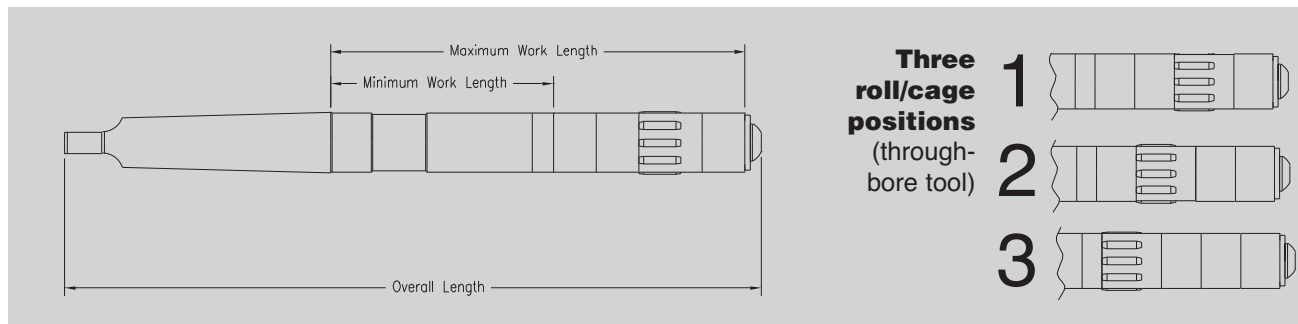
While the Roll-a-Finish Tool increases surface hardness by about 5 to 10%, Bearingizing increases hardness by 10 to 30%, but with less surface penetration.

Standard 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 tool life. Roll sizes are available in increments of .0025 mm (.0001 inch) and the tool will accommodate a range of roll sizes up to .0508 mm (.002 inch).

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



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

NOMINAL TOOL SIZE		BUILD-UP RANGE		CAM DIAMETER		SHANK	OVERALL LENGTH		WORK LENGTH				NO. OF ROLLS
									MAXIMUM		MINIMUM		
MM	INCHES	MM	INCHES	MM	INCHES		MM	INCHES	MM	INCHES	MM	INCHES	
4.76	.188	4.727 4.829	.1861 .1901	3.254	.1281	#1 MT	139.7	5.5	74.61	2.938	55.56	2.188	6
5.56	.219	5.522 5.624	.2174 .2214	4.049	.1594	#1 MT	139.7	5.5	74.61	2.938	55.56	2.188	6
6	.236	5.951 6.053	.2343 .2383	4.242	.1670	#1 MT	152.4	6	87.31	3.438	60.32	2.375	6
6.35	.250	6.314 6.416	.2486 .2526	4.587	.1806	#1 MT	152.4	6	87.31	3.438	60.32	2.375	6
7	.276	6.967 7.069	.2743 .2783	5.243	.2064	#1 MT	152.4	6	87.31	3.438	58.74	2.313	6
7.14	.281	7.109 7.211	.2799 .2839	5.382	.2119	#1 MT	152.4	6	87.31	3.438	58.74	2.313	6
7.94	.313	7.904 8.006	.3112 .3152	5.618	.2212	#1 MT	152.4	6	87.31	3.438	58.74	2.313	6
8	.315	7.968 8.069	.3137 .3177	5.667	.2238	#1 MT	152.4	6	87.31	3.438	58.74	2.313	6
8.73	.343	8.700 8.801	.3425 .3465	6.414	.2525	#1 MT	177.8	7	112.71	4.438	77.79	3.063	6
9	.354	8.966 9.068	.3530 .3570	6.683	.2631	#1 MT	177.8	7	112.71	4.438	77.79	3.063	6
9.53	.375	9.495 9.596	.3738 .3778	6.396	.2518	#1 MT	177.8	7	112.71	4.438	79.38	3.125	6
10	.394	9.970 10.071	.3965 .3925	6.871	.2705	#1 MT	177.8	7	112.71	4.438	79.38	3.125	6
10.32	.406	10.290 10.391	.4051 .4091	7.191	.2831	#1 MT	203.2	8	138.11	5.438	90.49	3.563	6
11	.433	10.973 11.074	.4320 .4360	7.059	.2779	#1 MT	203.2	8	138.11	5.438	93.66	3.688	6
11.11	.438	11.087 11.189	.4365 .4405	7.176	.2825	#1 MT	203.2	8	138.11	5.438	93.66	3.688	6
11.91	.469	11.882 11.984	.4678 .4718	7.971	.3138	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
12	.472	11.963 12.065	.4710 .4750	8.062	.3174	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8

Standard tool specifications

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

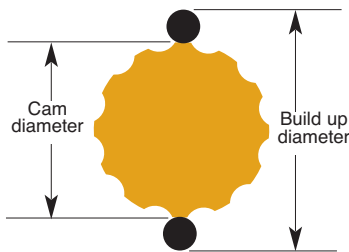
NOMINAL TOOL SIZE		BUILD-UP RANGE		CAM DIAMETER		SHANK	OVERALL LENGTH		WORK LENGTH				NO. OF ROLLS
MM	INCHES	MM	INCHES	MM	INCHES		MM	INCHES	MM	INCHES	MM	INCHES	
12.7	.500	12.675 12.776	.4990 .5030	8.763	.3450	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
13	.512	12.979 13.081	.5110 .5150	9.063	.3568	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
13.49	.531	13.470 13.571	.5303 .5343	9.558	.3763	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
14	.551	13.970 14.072	.5500 .5540	10.063	.3962	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
14.29	.563	14.262 14.364	.5615 .5655	10.351	.4075	#1 MT	203.2	8	138.11	5.438	93.66	3.688	8
15	.591	15.077 14.976	.5936 .5896	11.064	.4356	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
15.09	.594	15.057 15.159	.5928 .5968	11.146	.4388	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
15.87	.625	15.850 15.951	.6240 .6280	10.151	.4390	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
16	.630	15.977 16.078	.6290 .6330	11.275	.4439	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
16.67	.656	16.645 16.746	.6553 .6593	11.946	.4703	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
17	.669	16.967 17.069	.6680 .6720	12.276	.4833	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
17.46	.688	17.437 17.539	.6865 .6905	12.738	.5015	#2 MT	203.2	8	123.83	4.875	79.38	3.125	8
18	.709	17.983 18.085	.7080 .7120	13.277	.5227	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
18.26	.719	18.232 18.334	.7178 .7218	13.533	.5328	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
19	.748	18.974 19.075	.7470 .7510	14.275	.5620	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
19.05	.750	19.025 19.126	.7490 .7530	14.326	.5640	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
19.84	.781	19.820 19.921	.7803 .7843	15.121	.5953	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
20	.787	19.964 20.066	.7860 .7900	15.276	.6014	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
20.64	.813	20.612 20.714	.8115 .8155	15.913	.6265	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
21	.827	20.980 21.082	.8260 .8300	15.276	.6408	#2 MT	203.2	8	123.83	4.875	79.38	3.125	10
21.43	.844	21.407 21.509	.8428 .8468	15.133	.5958	#2 MT	228.6	9	149.23	5.875	95.25	3.75	10
22	.866	21.971 22.076	.8650 .8690	15.700	.6181	#2 MT	228.6	9	149.23	5.875	95.25	3.75	10
22.22	.875	22.200 22.301	.8740 .8780	15.926	.6270	#2 MT	228.6	9	149.23	5.875	95.25	3.75	10
23	.905	22.987 23.087	.9050 .9090	16.721	.6583	#3 MT	254.0	10	155.58	6.125	101.60	4.00	10
23.02	.906	22.995 23.096	.9053 .9093	16.721	.6583	#3 MT	254.0	10	155.58	6.125	101.60	4.00	10
23.81	.938	23.787 23.889	.9365 .9405	17.513	.6895	#3 MT	254.0	10	155.58	6.125	101.60	4.00	10
24	.945	23.978 24.078	.9440 .9480	17.701	.6969	#3 MT	254.0	10	155.58	6.125	101.60	4.00	10
24.61	.969	24.582 24.684	.9678 .9718	18.308	.7208	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
25	.984	24.968 25.070	.9830 .9870	18.702	.7363	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
25.4	1.000	25.375 25.476	.9990 1.0030	19.101	.7520	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
26.99	1.063	26.962 27.064	1.0615 1.0655	20.688	.8145	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
28.57	1.125	28.550 28.651	1.1240 1.1280	22.276	.8770	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
30.16	1.188	30.137 30.239	1.1865 1.1905	23.863	.9395	#3 MT	254.0	10	155.58	6.125	101.60	4.00	12
31.75	1.250	31.725 31.826	1.2490 1.2530	23.851	.9390	#4 MT	279.4	11	155.58	6.125	101.60	4.00	14

Tools for hole diameters from 31.75 to 50.8mm (1.250 to 2.000 inches) are non-stocked standards; tools above 50.8mm (2.000 inches) are special. 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.



Standard tool sizes

Tools are stocked in diameters of 4.7625mm (.187 inch) through 50.80mm (2.000 inch). Each tool provides a build-up range of .1016mm (.004 inch). The required build-up must be within the range of the tool size shown — otherwise select non-stocked tool. See ordering information at right.

EXAMPLE

Stainless Steel part	
12.725/12.720mm	
(.5010/.5008 inch) tolerance	12.7250
Add Stainless Steel spring-back allowance	+ .0254
Build-up	12.7504

Since a 12.75mm (.5020 inch) build-up falls within a range of 12.67-12.78mm (.4990-.5030 inch), order a standard 12.7mm (.500 inch) through-hole Bearingizing tool and rolls ... or order through-hole Bearingizing tool with 12.75mm (.5020 inch) 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	12.75mm (.5020 inch)
Subtract cam diameter of 12.75mm (.500 inch) tool	<u>- 8.76mm (.3450 inch)</u> 3.99mm (.1570 inch)
Divided by 2	<u>3.99mm ÷ 2 = 1.99mm (.0785 inch)</u>
Single roll size	1.99mm (.0785 inch)

Order 12.77mm (.500 inch)
Bearingizing tool with
1.99mm (.0785 inch) rolls.

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

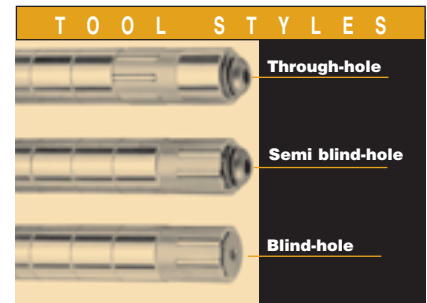
Note: Above are recommended starting points only. Final build-up can best be determined by actual trial and several extra sets of rolls in increments of .0025mm (.0001 inch) are recommended.

Ordering stocked tools

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 .635mm (.025 inch) of the bottom.

3 Extra sets of rolls in increments of .002mm (.0001 inch) are recommended with initial orders to allow for final size adjustment and compensate for eventual tool wear.



Ordering non-stocked tools

Intermediate sizes

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

Tools over 31.75mm (1.250 inch) 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 stocked tools and parts by fractional tool size shown on shank—except roll sizes, which should be determined by the required build-up. Re-order non-stocked tools and parts, including rolls by BT number shown on shank. If cams are worn, larger rolls may be required (available in increments of .0025mm (.0001 inch)). 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 .0025mm (.0001 inch) on harder materials to as much as .0762mm (.003 inch) on sintered self-lubricating bushings. Less than .0254mm (.001 inch) stock for Bearingizing generally provides a good starting point for trials.

Tool diameter changes

Bearingizing rolls are manufactured in increments of .0025mm (.0001 inch). 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 .1016mm (.004 inch) range by installing different sets of rolls. The rolls are diametrically opposed and available in .0025mm (.0001 inch) increments, therefore the effective tool diameter can be changed in .0051mm (.0002 inch) increments. (Refer to preceding page “Ordering Stocked Tools.”)

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.

bearingizing tools

External Roll-a-Finish™ tools

XBB 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.

Available from stock for nominal diameters from 1,5 to 20,0 mm (.059 to .787 inches). Micro XBB tools and XBB tools larger than 20,0mm are available upon request.

Offered in *two styles*:

- **Micro XBB tools**, with a very small body diameter and short overall length, are designed for Swiss auto-style machines. The tools cover a range of nominal diameters from 1,00 to 9,00mm (.039 to .354 inch).
- **Regular XBB tools** are available for nominal sizes from 1,5 to 65,0mm (.059 to 2.559 inch).

All XBB tools are bottoming-style and require machine feeding. The tools are adjustable in increments of .002mm (.0001 inch).

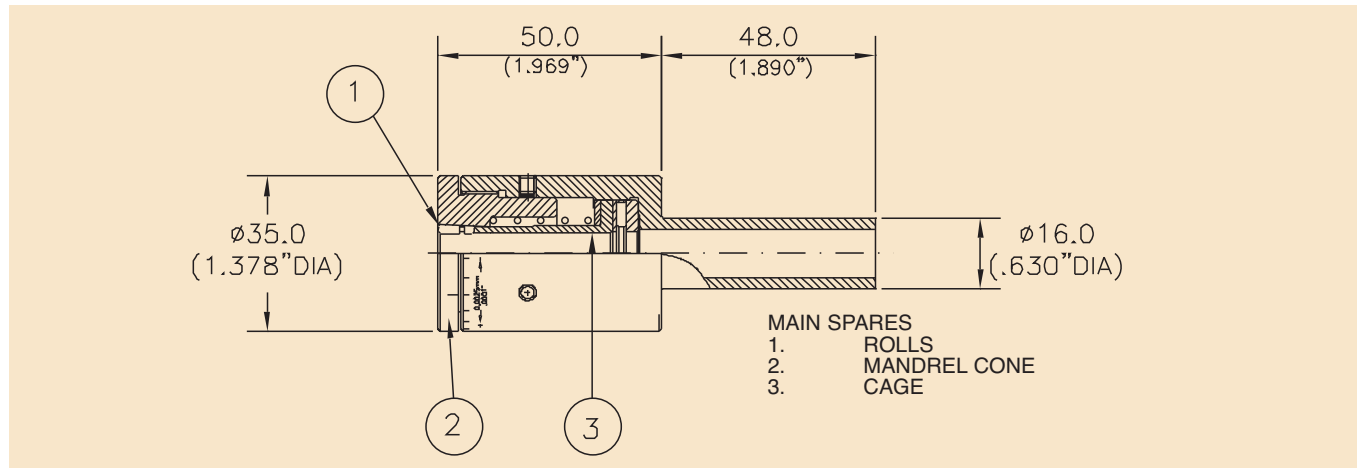


XBB 1,5-20,0



XBB 21,0-40,0

Standard tool specifications

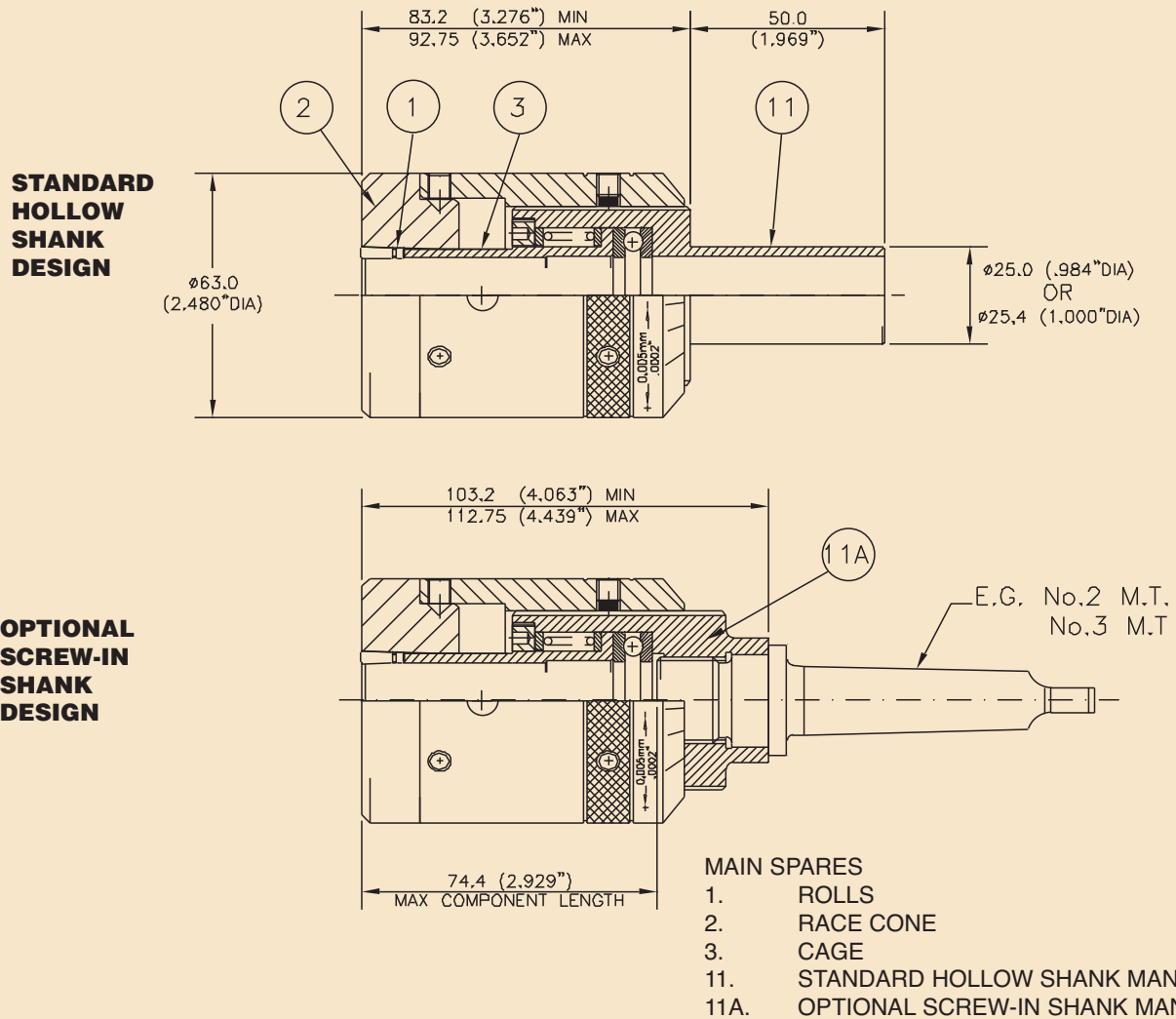


MICRO XBB SERIES ROLL-A-FINISH™ TOOLS

1,00 to 9,00mm (.039" to .354")

DIAMETER RANGE				TOOL NUMBER
MIN		MAX		BOTTOMING (No Helix)
mm	Inches	mm	Inches	
0,75	.030	1,025	.040	MICRO 1,00
1,00	.039	1,275	.050	MICRO 1,25
1,25	.049	1,525	.060	MICRO 1,50
1,50	.059	1,775	.070	MICRO 1,75
1,75	.069	2,025	.080	MICRO 2,00
2,00	.079	2,275	.090	MICRO 2,25
2,25	.089	2,525	.099	MICRO 2,50
2,50	.098	2,775	.109	MICRO 2,75
2,75	.108	3,025	.119	MICRO 3,00
3,00	.118	3,275	.129	MICRO 3,25
3,25	.128	3,525	.139	MICRO 3,50
3,50	.138	3,775	.149	MICRO 3,75
3,75	.148	4,025	.158	MICRO 4,00
4,00	.158	4,275	.168	MICRO 4,25
4,25	.167	4,525	.178	MICRO 4,50
4,50	.177	4,775	.188	MICRO 4,75
4,75	.187	5,025	.198	MICRO 5,00
5,00	.197	5,275	.208	MICRO 5,25
5,25	.207	5,525	.218	MICRO 5,50
5,50	.217	5,775	.227	MICRO 5,75
5,75	.226	6,025	.237	MICRO 6,00
6,00	.236	6,275	.247	MICRO 6,25
6,25	.246	6,525	.257	MICRO 6,50
6,50	.256	6,775	.267	MICRO 6,75
6,75	.266	7,025	.277	MICRO 7,00
7,00	.276	7,275	.286	MICRO 7,25
7,25	.285	7,525	.296	MICRO 7,50
7,50	.295	7,775	.306	MICRO 7,75
7,75	.305	8,025	.316	MICRO 8,00
8,00	.315	8,275	.326	MICRO 8,25
8,25	.325	8,525	.336	MICRO 8,50
8,50	.335	8,775	.345	MICRO 8,75
8,75	.344	9,025	.355	MICRO 9,00

Standard tool specifications



XBB SERIES ROLL-A-FINISH™ TOOLS

1,5 to 20,0mm (.059" to .787")

SEE NEXT PAGE FOR CHART

Standard tool specifications

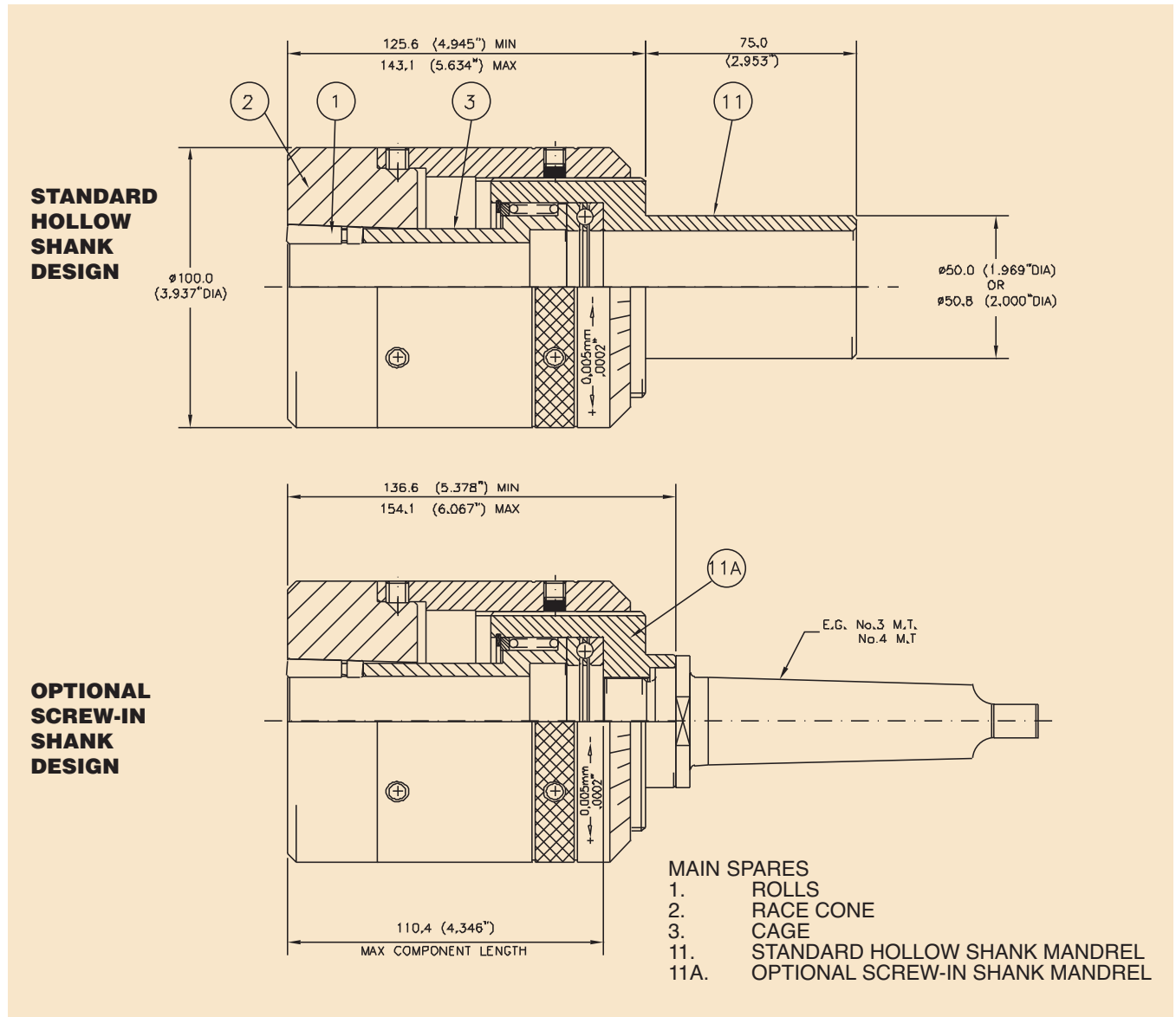
XBB SERIES ROLL-A-FINISH™ TOOLS

1,5 to 20,0mm (.059" to .787")

DIAMETER RANGE				TOOL NUMBER
MIN		MAX		BOTTOMING (No Helix)
mm	Inches	mm	Inches	
1,00	.039	1,60	.063	XBB 1,5
1,50	.059	2,10	.083	XBB 2,0
2,00	.078	2,60	.102	XBB 2,5
2,50	.098	3,10	.122	XBB 3,0
3,00	.118	3,60	.142	XBB 3,5
3,50	.138	4,10	.161	XBB 4,0
4,00	.157	4,60	.181	XBB 4,5
4,50	.177	5,10	.201	XBB 5,0
5,00	.197	5,60	.220	XBB 5,5
5,50	.217	6,10	.240	XBB 6,0
6,00	.236	6,60	.260	XBB 6,5
6,50	.256	7,10	.280	XBB 7,0
7,00	.276	7,60	.299	XBB 7,5
7,50	.295	8,10	.319	XBB 8,0
8,00	.315	8,60	.339	XBB 8,5
8,50	.335	9,10	.358	XBB 9,0
9,00	.354	9,60	.378	XBB 9,5
9,50	.374	10,10	.398	XBB 10,0
10,00	.394	10,60	.417	XBB 10,5
10,50	.413	11,10	.437	XBB 11,0
11,00	.433	11,60	.457	XBB 11,5
11,50	.453	12,10	.476	XBB 12,0
12,00	.472	12,60	.496	XBB 12,5
12,50	.492	13,10	.516	XBB 13,0
13,00	.512	13,60	.535	XBB 13,5
13,50	.531	14,10	.555	XBB 14,0
14,00	.551	14,60	.575	XBB 14,5
14,50	.571	15,10	.594	XBB 15,0
15,00	.591	15,60	.614	XBB 15,5
15,50	.610	16,10	.634	XBB 16,0
16,00	.630	16,60	.654	XBB 16,5
16,50	.650	17,10	.673	XBB 17,0
17,00	.669	17,60	.693	XBB 17,5
17,50	.689	18,10	.713	XBB 18,0
18,00	.709	18,60	.732	XBB 18,5
18,50	.728	19,10	.752	XBB 19,0
19,00	.748	19,60	.772	XBB 19,5
19,50	.768	20,10	.791	XBB 20,0

Optional Self-Feeding 1 1/2° Helix Style Tools are Available from XBB 6,5 onwards

Standard tool specifications



XBB SERIES ROLL-A-FINISH™ TOOLS

21,0 to 40,0mm (.827" to 1.575")

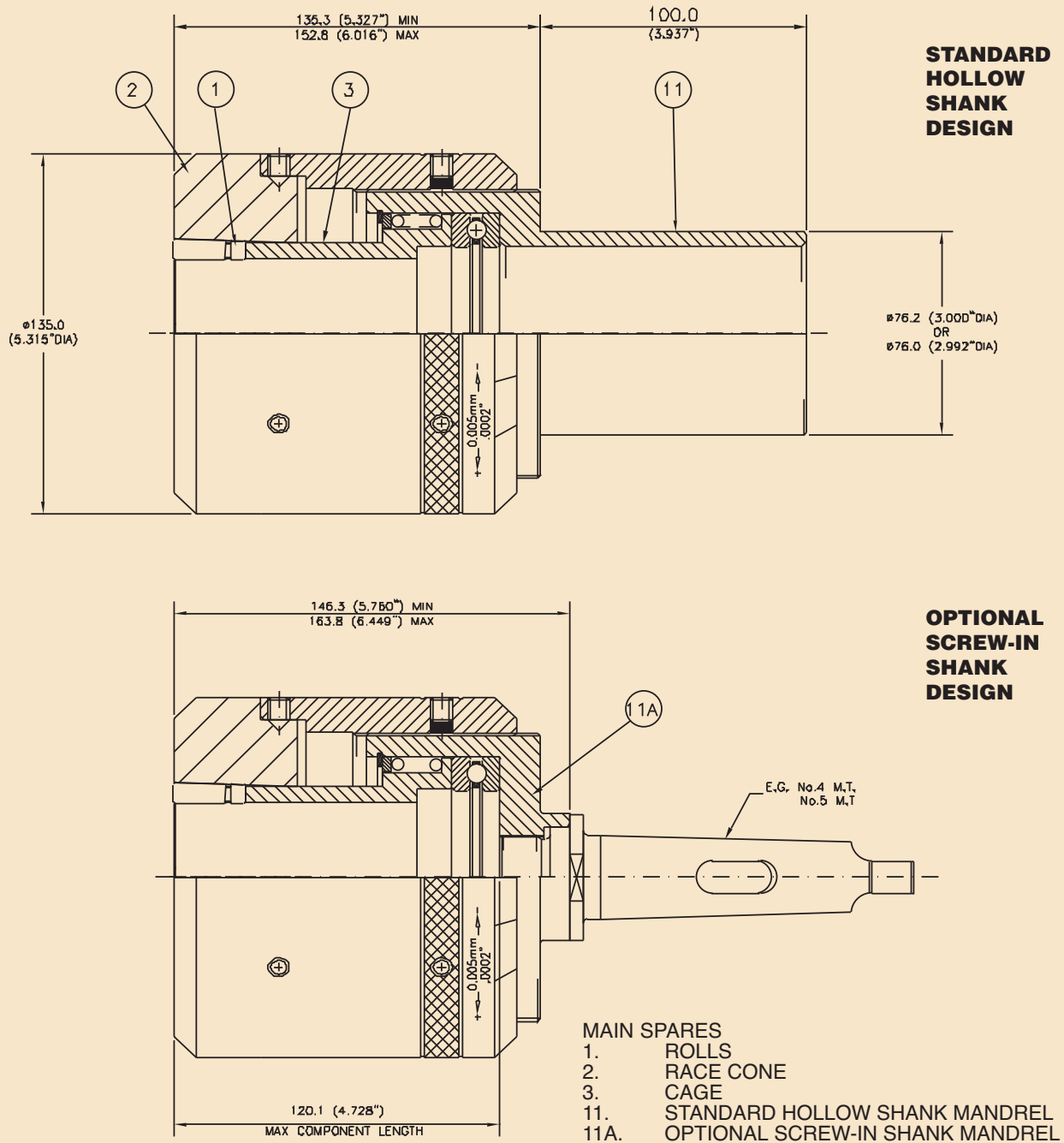
SEE NEXT PAGE FOR CHART

XBB SERIES ROLL-A-FINISH™ TOOLS

21,0 to 40,0mm (.827" to 1.575")

DIAMETER RANGE				TOOL NUMBER
MIN		MAX		BOTTOMING (No Helix)
mm	Inches	mm	Inches	
20,00	.787	21,10	.831	XBB 21
21,00	.827	22,10	.870	XBB 22
22,00	.866	23,10	.909	XBB 23
23,00	.906	24,10	.949	XBB 24
24,00	.945	25,10	.988	XBB 25
25,00	.984	26,10	1.028	XBB 26
26,00	1.024	27,10	1.067	XBB 27
27,00	1.063	28,10	1.106	XBB 28
28,00	1.102	29,10	1.146	XBB 29
29,00	1.142	30,10	1.185	XBB 30
30,00	1.181	31,10	1.224	XBB 31
31,00	1.220	32,10	1.264	XBB 32
32,00	1.260	33,10	1.303	XBB 33
33,00	1.299	34,10	1.343	XBB 34
34,00	1.339	35,10	1.382	XBB 35
35,00	1.378	36,10	1.421	XBB 36
36,00	1.417	37,10	1.461	XBB 37
37,00	1.457	38,10	1.500	XBB 38
38,00	1.496	39,10	1.539	XBB 39
39,00	1.535	40,10	1.579	XBB 40
Optional Self-Feeding 1 1/2° Helix Style Tools are Available for all Sizes in this Range				

Standard tool specifications



XBB SERIES ROLL-A-FINISH™ TOOLS

41,0 to 65,0mm (1.614" to 2.559")

SEE NEXT PAGE FOR CHART

XBB SERIES ROLL-A-FINISH™ TOOLS

41,0 to 65,0mm (1.614" to 2.559")

DIAMETER RANGE				TOOL NUMBER
MIN		MAX		BOTTOMING (No Helix)
mm	Inches	mm	Inches	
40,00	1.575	41,10	1.618	XBB 41
41,00	1.614	42,10	1.657	XBB 42
42,00	1.654	43,10	1.697	XBB 43
43,00	1.693	44,10	1.736	XBB 44
44,00	1.732	45,10	1.776	XBB 45
45,00	1.772	46,10	1.815	XBB 46
46,00	1.811	47,10	1.854	XBB 47
47,00	1.850	48,10	1.894	XBB 48
48,00	1.890	49,10	1.933	XBB 49
49,00	1.929	50,10	1.972	XBB 50
50,00	1.969	51,10	2.012	XBB 51
51,00	2.008	52,10	2.051	XBB 52
52,00	2.047	53,10	2.091	XBB 53
53,00	2.087	54,10	2.130	XBB 54
54,00	2.126	55,10	2.169	XBB 55
55,00	2.165	56,10	2.209	XBB 56
56,00	2.205	57,10	2.248	XBB 57
57,00	2.244	58,10	2.287	XBB 58
58,00	2.283	59,10	2.327	XBB 59
59,00	2.323	60,10	2.366	XBB 60
60,00	2.362	61,10	2.406	XBB 61
61,00	2.402	62,10	2.445	XBB 62
62,00	2.441	63,10	2.484	XBB 63
63,00	2.480	64,10	2.524	XBB 64
64,00	2.520	65,10	2.563	XBB 65

Optional Self-Feeding 1° Helix Style Tools are Available for all Sizes in this Range

ROLLS

EXTERNAL ROLLER BURNISHING ROLL CHART		
TOOL NUMBER		QTY / TOOL
(FROM - TO)	BOTTOMING	
MICRO XBB 1,00-5,50	B250	3
MICRO XBB 6,00-9,00	B250	5
XBB 1,50 - 5,50	B312	3
XBB 6,0 - 20	B438	5
XBB 21 - 40	B875	7
XBB 41 - 65	B1125	9

Selection & ordering information

Internal Roll-a-Finish™ tools

Specify tool number. First select series SRMR or SRMB. If self-feeding cage is desired, add "helix." If a bottoming tool is desired add a "B". Next, indicate nominal tool size. (*Examples: SRMR 25; SRMB 25; SRMR 25 with helix.*)

If extra work length is desired, designate by adding the suffix +50 or +100. (*Examples: SRMR 25+50, SRMR 25+100.*) 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. (*Examples: XBB20,0; XBB40,0.*)

For self feeding tools, please specify "with helix".

Replacement parts

For mandrel or race assemblies, specify tool number and description of part. (*Examples: XBB 25,0 mandrel assembly; XBB40,0 race assembly.*)

Order individual components by detail number (if known).

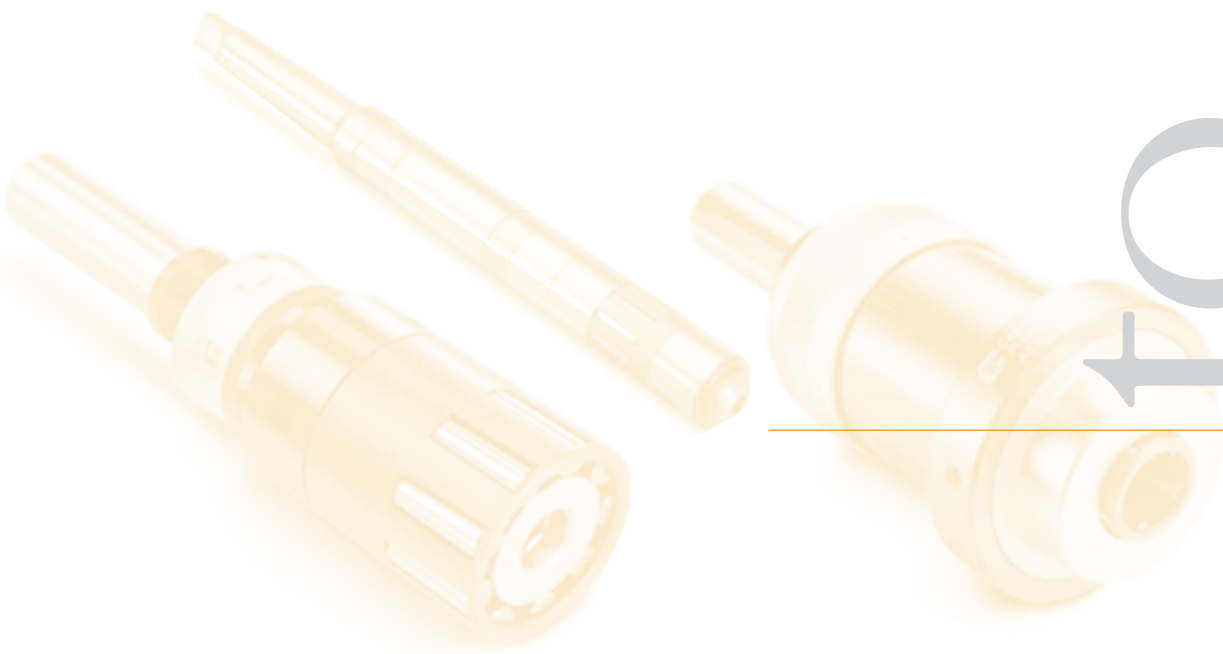
Order replacement rolls in complete sets. (NOTE: Mixing new and used rolls will reduce the effectiveness of the tool.) Specify detail number, description, and tool number. (*Example: Set of rolls for XBB 25,0.*)

NOTE: Use cage marking to establish nominal tool size.

Bearingizing tools

For tool selection and ordering information for Bearingizing tools and replacement parts, please refer to page 20.

order to



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. A 2-3 micrometers Ra surface (80-120 microinch), 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 prefinished 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 31. 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

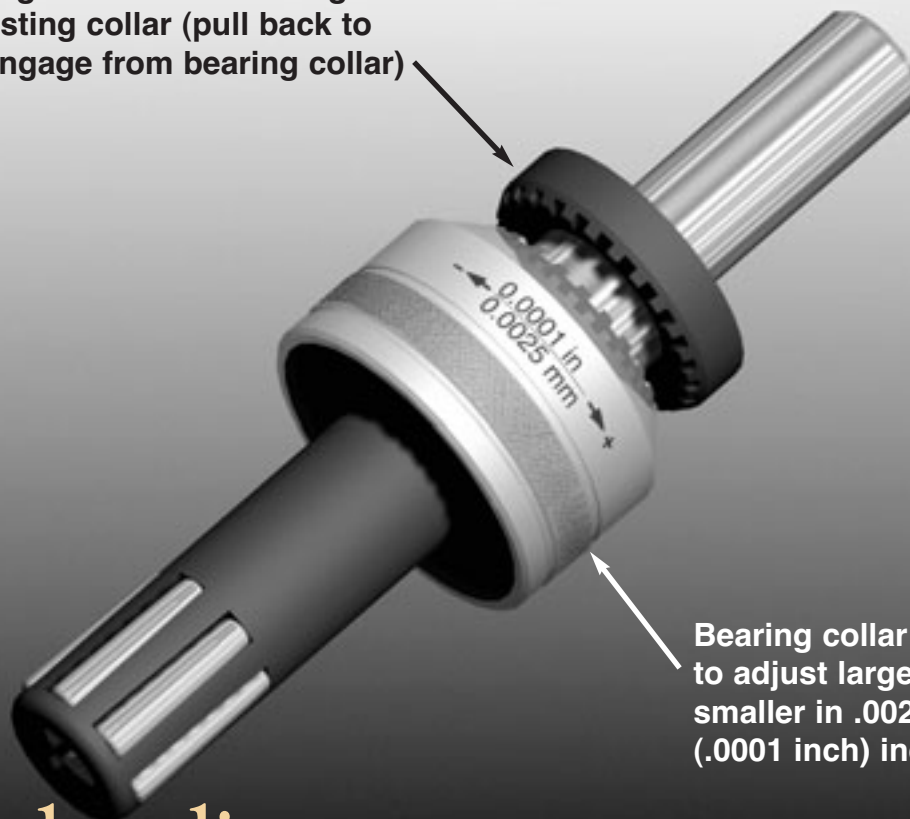
Tool adjustment procedure

Cogsdill 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 SRMR and SRMB 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. XBB tools are adjusted by rotating the housing on the threaded mandrel shank. Tool adjustment requires the use of an Allen wrench. SRMR, SRMB and XBB series tools adjust in increments of .0025mm (.0001 inch), and in increments of .005mm (.0002 inch) for tools over 50mm in diameter.

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



Bearing collar (rotate to adjust larger or smaller in .0025mm (.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 .01 to .02mm (.0005 to .001inch) over the prepared part diameter. On SRMR and SRMB tools, a one-notch change equals .002mm (.0001 inch) diameter change. On tools over 50.0mm in diameter, calibrations are in .005mm (.0002 inch) 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	
	Micrometers	Microinches
Hone	.25-.50	10-20
Grind	.50-1.00	20-40
Ream	1.00-1.50	40-60
Bore, Turn (Medium)	2.00-3.00	80-100
Bore, Turn (Rough)	3.75-5.00	150-200

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

Surface finishes of .25micrometers (10 microinches) 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.

When the Roll-a-Finish tool reaches the end of the desired roller burnishing length, pull the tool from the bore. 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 SRMR and SRMB tools from 12.0 to 25.0mm have a common adjustment assembly.

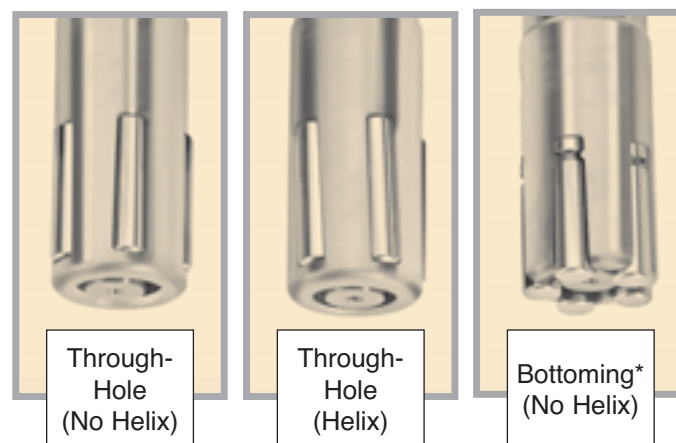
All standard Roll-a-Finish tools 6.0mm and above can be changed from through-hole to bottoming by changing cage and rolls.

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

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

(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 SRMR and SRMB tools and bottoming style tools with power-feeding cages must be from .25mm/rev. (.010 IPR) up to the maximum rate (shown at left) for the self-feeding tools for the same diameter.

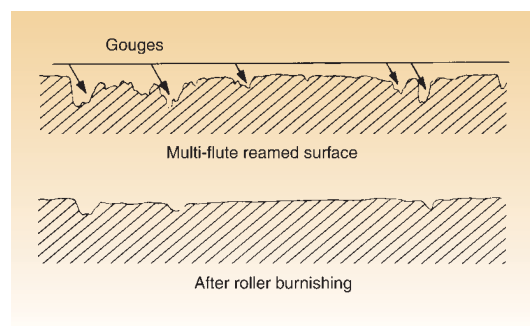
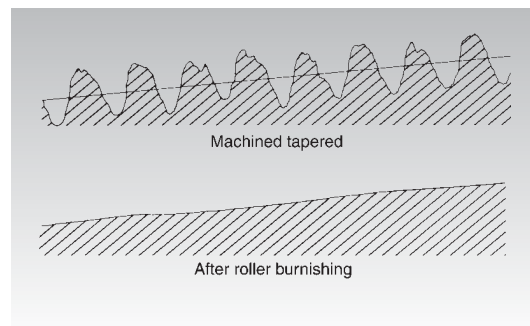
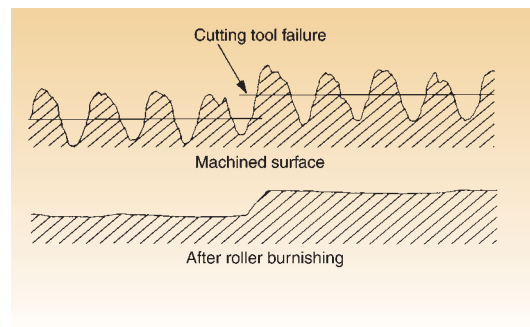


**Mandrel may be cut off if it does not allow full bottoming.*

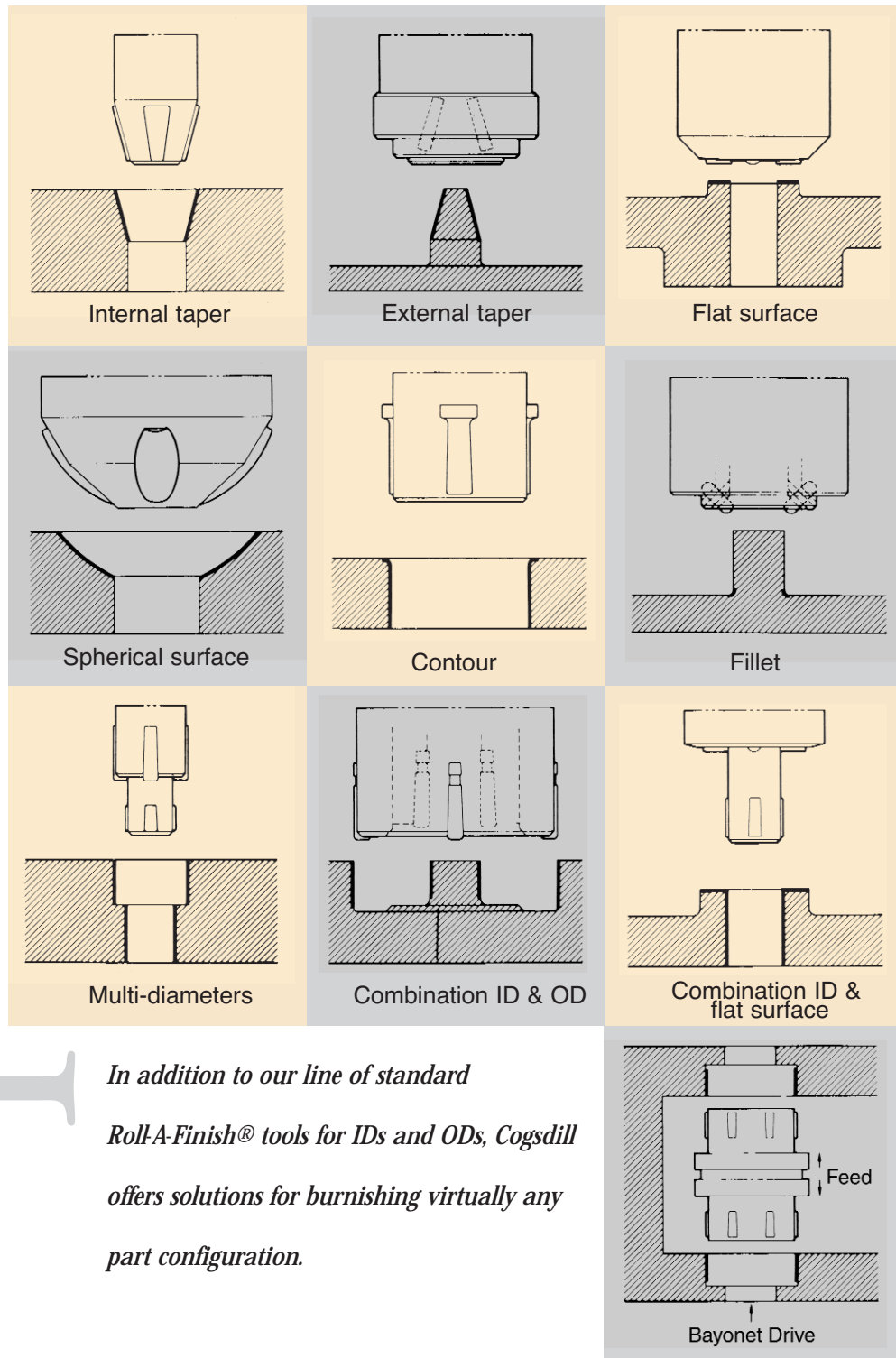
Part preparation & operating parameters for roller burnishing

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 (presize) and Roll-a-Finish tool.
B. Bell mouth or taper.	Premachining problem	Check before burnishing.
	Misalignment.	Correct or use floating holder.
	Tool runout. Part has thin wall, irregular geometry, or no support.	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.	Use R-style or consider special tool.
	Mandrel hits bottom of bore or fixture.	Grind mandrel tip off, use larger tool size, or consider special tool.

Effects of poorly machined surfaces on burnishing



Special applications & tool designs



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

Special applications & tool designs

In 1993 Cogsdill Tool Products acquired The Madison Microller® 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:



Flat surface tool

Internal taper tool

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



Expander tool

Air-actuated compensating tool

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

External roller burnishing machines

CXTM
machines



CX-M

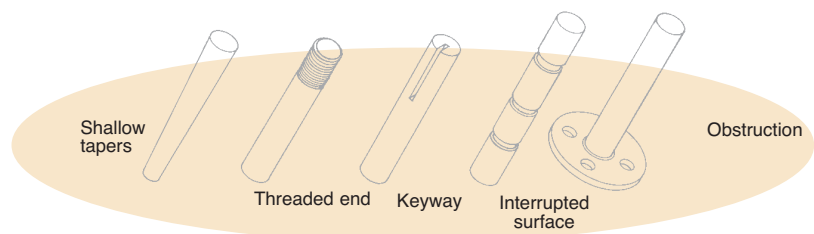


CX-1T



CX-1N

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 41, "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. Two lightweight, compact models are available where portability is a major factor to consider; a pair of heavy duty, high production models round out a product line designed to meet your production needs.

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 .0025mm (.0001inch) 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 .05mm (.002 in) can be reduced to .02mm (.001 in). In applications requiring closer tolerances, .02mm (.001inch) can be reduced to 7.5microns (.0003 inch).

Low micro finishing

One pass through a Cogsdill CX machine can quickly reduce a 0.5 to 1.0 micrometer Ra (20-40 microinch) ground surface or a 2-3 micrometer Ra (80-120 microinch) turned surface to a mirrorlike .125 micrometer Ra (5 microinch) finish or lower. Parts varying in size as much as .127 mm (.005 inch) 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 9.14 meters/minute (30 feet per 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 are adjustable in increments of .0025mm (.0001 inch) over a range of .53mm (.021 inch) for each nominal size. CX-2 race assemblies are adjustable in increments of .0051mm (.0002 inch) over a range of 1.04mm (.041 inch) for each nominal size (see page 40 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.

Machine models

CX-M

The Cogsdill CX-M External Roller Burnishing Machine sizes and finishes part diameters from 1.14 to 16.87mm (.045 to .625 inch) in seconds. This inexpensive machine is light and compact—a real space saver—and easily portable too—only 32 kg (70 lbs.).

Set-up is fast and simple, and the CX-M is easy and economical to operate. The machine is self-feeding, and can be adapted to automatic feeders. Operates on 120V single-phase power.



CX-1T

The CX-1T External Roller Burnishing Machine is a light, compact model designed specifically for portability or bench top operation at multiple work stations. Weighing less than 68 kg (150 lbs.) and occupying less than .099 cubic meters (3.5 cubic feet) of space, the CX-1T can easily be transported to any location in the shop. The machine operates with a continuously variable speed drive and can be bench mounted or placed on an optional mobile cabinet bench.

The CX-1T processes parts ranging from 1.143 to 25.502mm (.045 to 1.004 inches) in diameter.

CX-1N

The CX-1N External Roller Burnishing Machine processes parts in the same size range as the portable CX-1T, but is designed for permanent installation on the production floor. The burnishing head is belt driven and has a continuously variable speed drive. A coolant system and drip pan are mounted on the same frame with the motor and burnishing head. The CX-1N is specifically designed for rugged high production use.

The CX-1N utilizes the same race assemblies as the CX-1T and processes parts ranging from 1.143 to 25.502mm (.045 to 1.004 inches) in diameter.



CX-2N

The CX-2N External Roller Burnishing Machine, like the CX-1N is designed to be permanently installed on the production floor. Overall design is similar to the CX-1N; however, this model processes parts from 25.460 to 63.602mm (.963 to 2.504 inches) in diameter. The CX-2N can also be adapted to accept CX-1N race assemblies (to accommodate diameters as small as 1.143mm (.045 inch)). The CX-2N features a continuously variable speed drive and a frame designed for heavy duty use.

Machines to burnish parts larger than 63.5mm (2.500 inches) in diameter are built to special order; contact our Engineering Department for details.

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 .01mm or .0005 inch) 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 .13mm (.005 inch) 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 .76mm (.030 inch).

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 MM/REV	CX-B MM/REV	CX-R MM/REV	CX-RB MM/REV
CX-062	1800	1.60	0.79	1.35	0.74
CX-125	1800	1.88	0.94	1.73	1.19
CX-187	1800	2.13	1.07	1.90	0.94
CX-250	1800	2.39	1.19	2.16	1.07
CX-312	1800	2.64	1.32	2.41	1.19
CX-375	1800	2.92	1.45	2.69	1.35
CX-438	1400	3.68	1.83	3.39	1.68
CX-500	1400	3.96	1.98	3.66	1.83
CX-562	1400	4.22	2.11	3.91	1.96
CX-625	1200	4.47	2.24	4.17	2.08
CX-687	1200	4.75	2.36	4.45	2.21
CX-750	1200	5.00	2.49	4.70	2.34
CX-812	1000	5.59	2.82	5.28	2.64
CX-875	900	5.92	2.95	5.54	2.77
CX-934	900	6.17	3.07	5.79	2.90
CX-1000	900	6.45	3.23	6.05	3.02

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
external roller burnishing machines

CX™ Race Assemblies

The same race assemblies are used for the CX-1T and the CX-1N external roller burnishing machines. Those race assemblies are shown below, in both interference and compensating styles.

For information on race assemblies for CX-M and CX-2N machines, contact Customer Service.

INTERFERENCE-STYLE

PART NUMBER	DIAMETER RANGE	
	IN.	MM
CX-062	.045-.066	1.14-1.68
CX-078	.061-.082	1.55-2.08
CX-094	.077-.098	1.96-2.49
CX-109	.092-.113	2.34-2.87
CX-125	.108-.129	2.74-3.28
CX-141	.124-.145	3.15-3.68
CX-156	.139-.160	3.53-4.06
CX-171	.154-.175	3.91-4.45
CX-187	.170-.191	4.32-4.85
CX-203	.186-.207	4.72-5.26
CX-219	.202-.223	5.13-5.66
CX-234	.217-.238	5.51-6.05
CX-250	.233-.254	5.92-6.45
CX-266	.249-.270	6.32-6.86
CX-281	.264-.285	6.71-7.65
CX-297	.280-.301	7.11-7.65
CX-312	.295-.316	7.49-8.03
CX-328	.311-.332	7.90-8.43
CX-344	.327-.348	8.31-8.84
CX-359	.342-.363	8.69-9.22
CX-375	.358-.379	9.09-9.63
CX-391	.375-.395	9.53-10.03
CX-406	.389-.410	9.88-10.41
CX-422	.405-.426	10.29-10.82
CX-438	.420-.441	10.67-11.2
CX-453	.436-.457	11.07-11.61
CX-469	.452-.473	11.48-12.01
CX-484	.467-.488	11.86-12.4
CX-500	.483-.504	12.27-12.8
CX-516	.499-.520	12.68-13.21
CX-531	.514-.535	13.06-13.59

PART NUMBER	DIAMETER RANGE	
	IN.	MM
CX-547	.530-.551	13.46-14.00
CX-562	.545-.566	13.84-14.38
CX-578	.561-.582	14.25-14.78
CX-594	.577-.598	14.56-15.19
CX-609	.592-.613	15.03-15.57
CX-625	.608-.629	15.44-15.98
CX-641	.624-.645	15.85-16.38
CX-656	.639-.660	16.23-16.76
CX-672	.655-.676	16.64-17.17
CX-688	.671-.692	17.04-17.58
CX-703	.686-.707	17.42-17.96
CX-719	.702-.723	17.83-18.36
CX-734	.717-.738	18.21-18.75
CX-750	.733-.754	18.62-19.15
CX-766	.749-.770	19.03-19.56
CX-781	.764-.785	19.41-19.94
CX-797	.780-.801	19.81-20.35
CX-812	.795-.816	20.19-20.73
CX-828	.811-.832	20.60-21.13
CX-844	.827-.848	21.01-21.54
CX-859	.842-.863	21.39-21.92
CX-875	.858-.879	21.79-22.33
CX-891	.874-.895	22.20-22.73
CX-906	.889-.910	22.58-23.11
CX-922	.905-.926	22.98-23.52
CX-938	.921-.942	23.39-23.93
CX-953	.936-.957	23.77-24.31
CX-969	.952-.973	24.18-24.71
CX-984	.967-.988	24.56-25.10
CX-1000	.983-1.004	24.97-25.50

COMPENSATING-STYLE

PART NUMBER	DIAMETER RANGE	
	IN.	MM
CX-062	.058-.070	1.47-1.78
CX-078	.074-.095	1.88-2.41
CX-094	.090-.111	2.29-2.82
CX-109	.105-.126	2.67-3.20
CX-125	.121-.142	3.07-3.61
CX-141	.137-.158	3.48-4.01
CX-156	.152-.173	3.86-4.39
CX-171	.167-.188	4.24-4.78
CX-187	.183-.204	4.65-5.18
CX-203	.199-.220	5.06-5.59
CX-219	.215-.236	5.46-5.99
CX-234	.230-.251	5.84-6.38
CX-250	.246-.267	6.25-6.78
CX-266	.262-.283	6.66-7.19
CX-281	.277-.298	7.04-7.57
CX-297	.293-.314	7.44-7.98
CX-312	.308-.329	7.82-8.36
CX-328	.324-.345	8.23-8.76
CX-344	.340-.361	8.64-9.17
CX-359	.355-.376	9.02-9.55
CX-375	.371-.392	9.42-9.96
CX-391	.387-.408	9.83-10.36
CX-406	.402-.423	10.21-10.74
CX-422	.418-.437	10.62-11.10
CX-438	.434-.455	11.02-11.56
CX-453	.449-.470	11.41-11.94
CX-469	.465-.486	11.81-12.34
CX-484	.480-.501	12.19-12.73
CX-500	.496-.517	12.60-13.13
CX-516	.512-.533	13.01-13.54
CX-531	.527-.548	13.39-13.92

PART NUMBER	DIAMETER RANGE	
	IN.	MM
CX-547	.543-.564	13.79-14.33
CX-562	.558-.579	14.17-14.71
CX-578	.574-.595	14.58-15.11
CX-594	.590-.611	14.99-15.52
CX-609	.605-.626	15.37-15.90
CX-625	.612-.642	15.55-16.31
CX-641	.637-.658	16.18-16.71
CX-656	.652-.673	16.56-17.09
CX-672	.668-.689	16.97-17.50
CX-688	.684-.705	17.37-17.91
CX-703	.699-.720	17.76-18.29
CX-719	.715-.736	18.16-18.69
CX-734	.730-.751	18.54-19.08
CX-750	.746-.767	18.95-19.48
CX-766	.762-.783	19.36-19.89
CX-781	.777-.798	19.74-20.27
CX-797	.793-.814	20.14-20.68
CX-812	.808-.829	20.52-21.06
CX-828	.824-.845	20.93-21.46
CX-844	.840-.861	21.34-21.87
CX-859	.855-.876	21.72-22.25
CX-875	.871-.892	22.12-22.66
CX-891	.887-.908	22.53-23.06
CX-906	.902-.923	22.91-23.44
CX-922	.918-.939	23.32-23.85
CX-938	.934-.955	23.72-24.26
CX-953	.949-.970	24.11-24.64
CX-969	.965-.986	24.51-25.04
CX-984	.980-1.001	24.89-25.43
CX-1000	.996-1.017	25.30-25.83

Diamond burnishing tools

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

- Four 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.

Four 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

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 2-3 micrometers (80 to 100 microinch) finish can be burnished to a 4 to 8 microinch finish in seconds. Cast iron can usually be burnished to a 0.2 - 0.4 micrometers (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.

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



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 .05 or .08mm (.002 or .003 inch) 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. Next, tighten the screw approximately two turns until the spring bottoms out, and then back off one full turn. This 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 80 to 100 R.M.S. for best results. A feed rate of .076 to .102mm (.003 to .004 inches) per revolution at speeds up to 229 surface meters per minute (750 surface feet per minute) is generally recommended when using the Cogsdill Diamond Burnishing Tool.

Normally, after the tool has been set to provide the .05 to .08mm (.002 to .003 inch) "interference", it can be fed onto the rotating workpiece 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.)

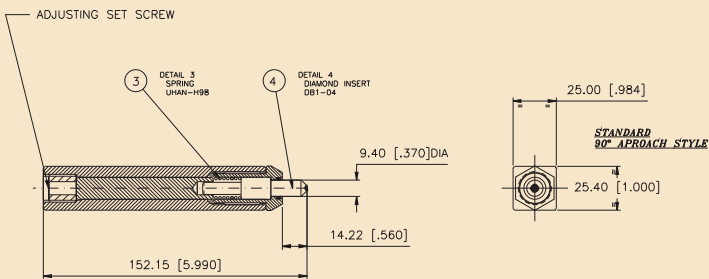
Note: Diamond burnishing tools do not have the advantage of an overlapping effect as with multi-roll tools, and for this reason slower feed rates and/or multiple passes over the part may be required in order to produce the desired finish.



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.

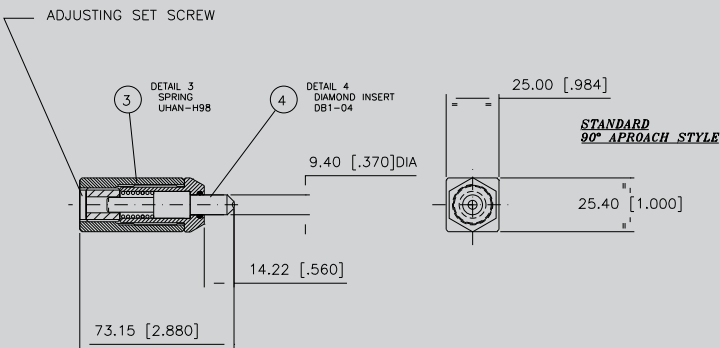
Standard tool specifications

DB-1



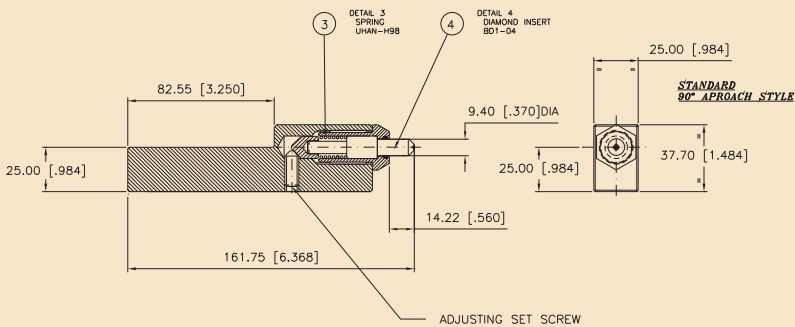
METRIC (INCH)

DB-2



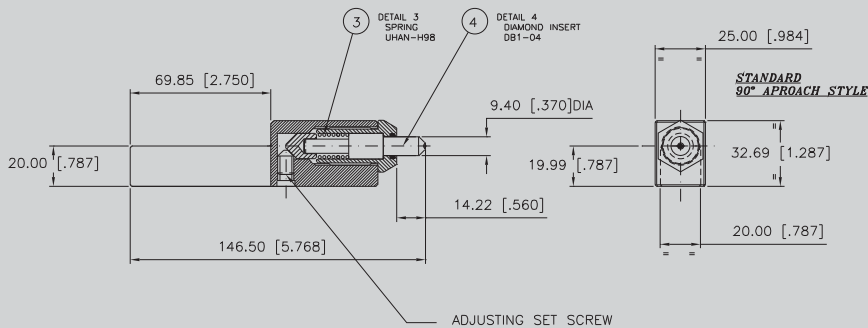
METRIC (INCH)

DB-3



METRIC (INCH)

DB-4

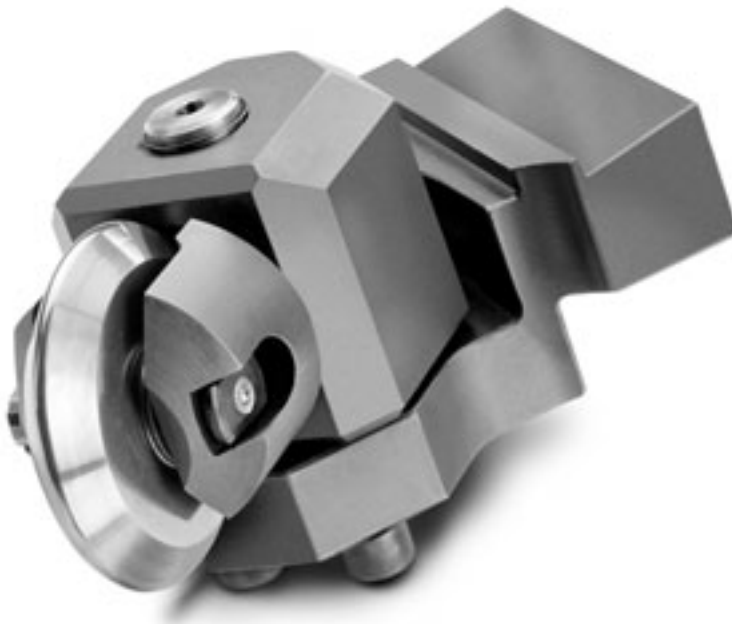


METRIC (INCH)

Universal™ burnishing tools

*For burnishing shafts, faces, tapers,
contours, and relatively large IDs
(greater than 70.00mm/2.750 inches)*

- *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-T indexable turning holder-style burnishing tool
(Left-hand tool shown)



UBT-B1 boring bar-style burnishing tool

Versatility



UBT-B1 burnishing O.D.



UBT-B1 burnishing face

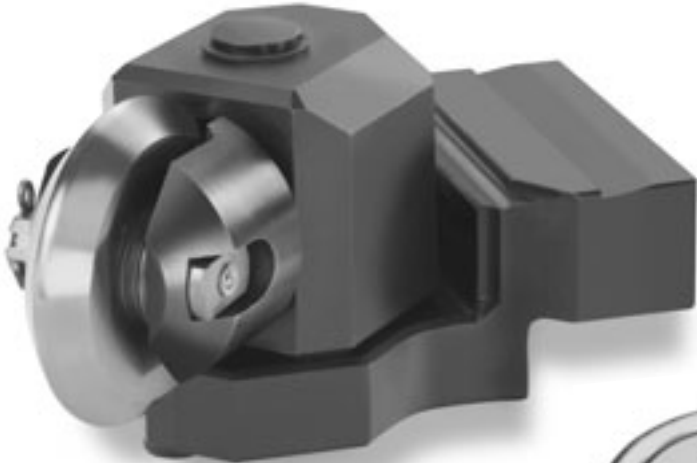


UBT-T1 burnishing taper

(Left-hand tool shown)

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

Turning-holder style



UBT-T1



UBT-T2



UBT-T3



Roll shield installed above

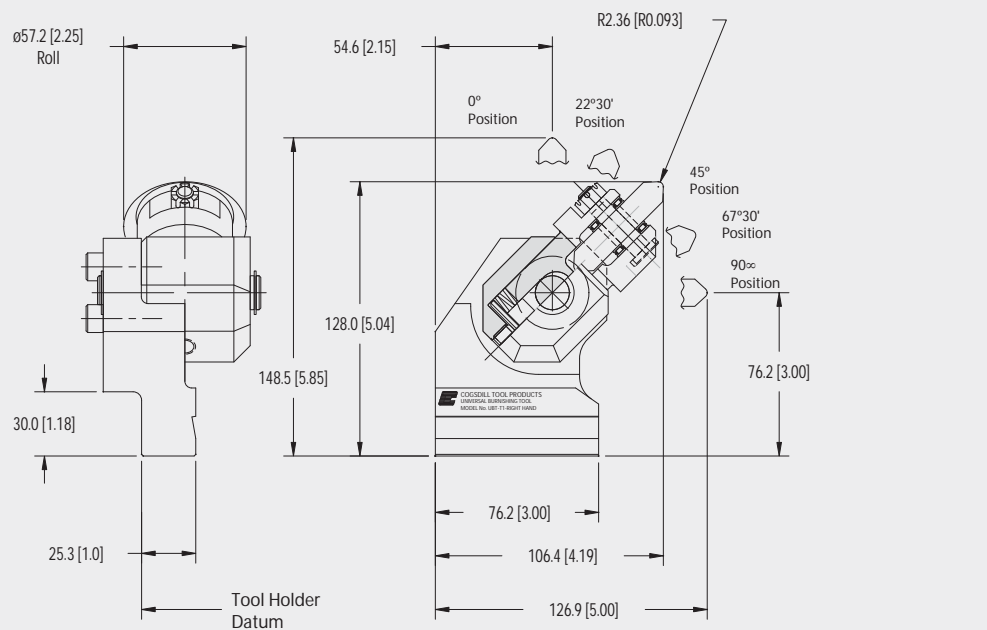
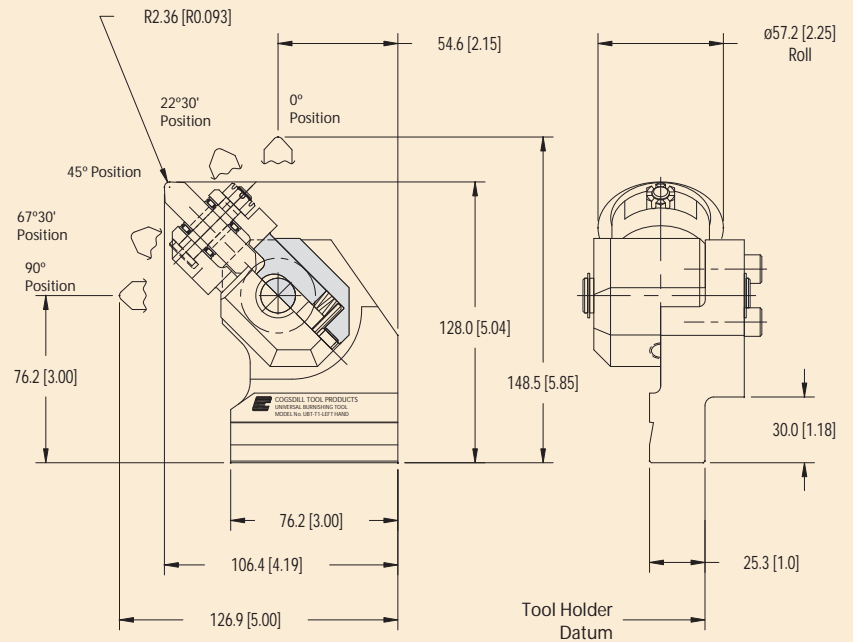
Turning-holder style

UBT-T1

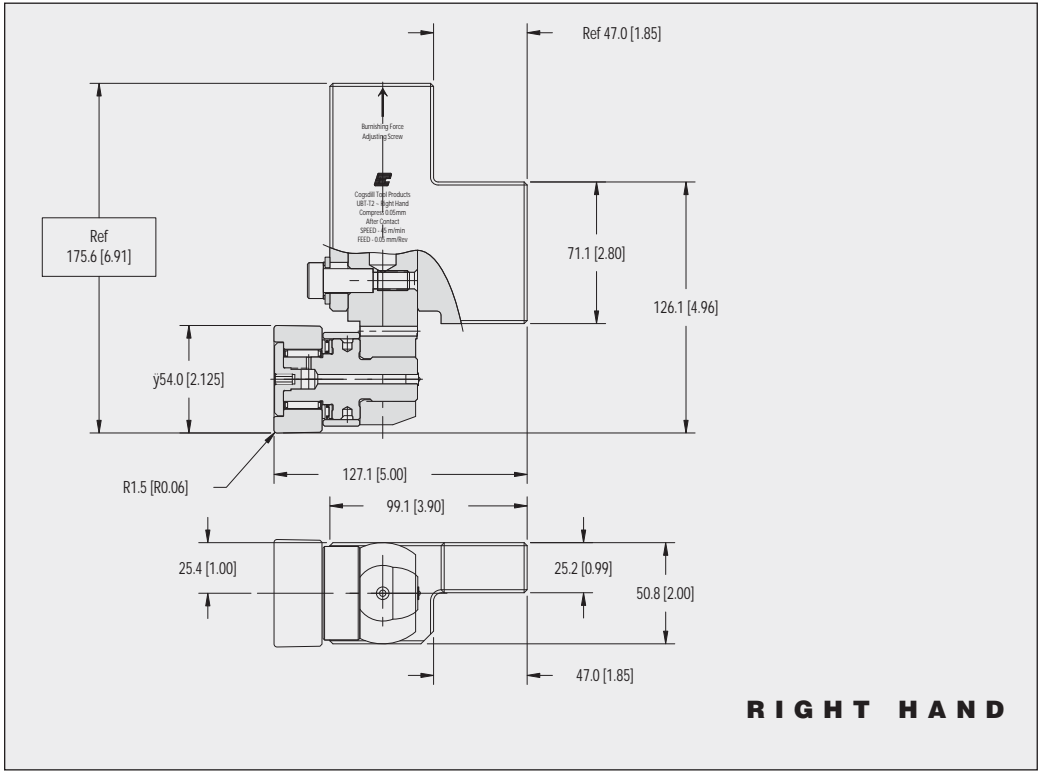
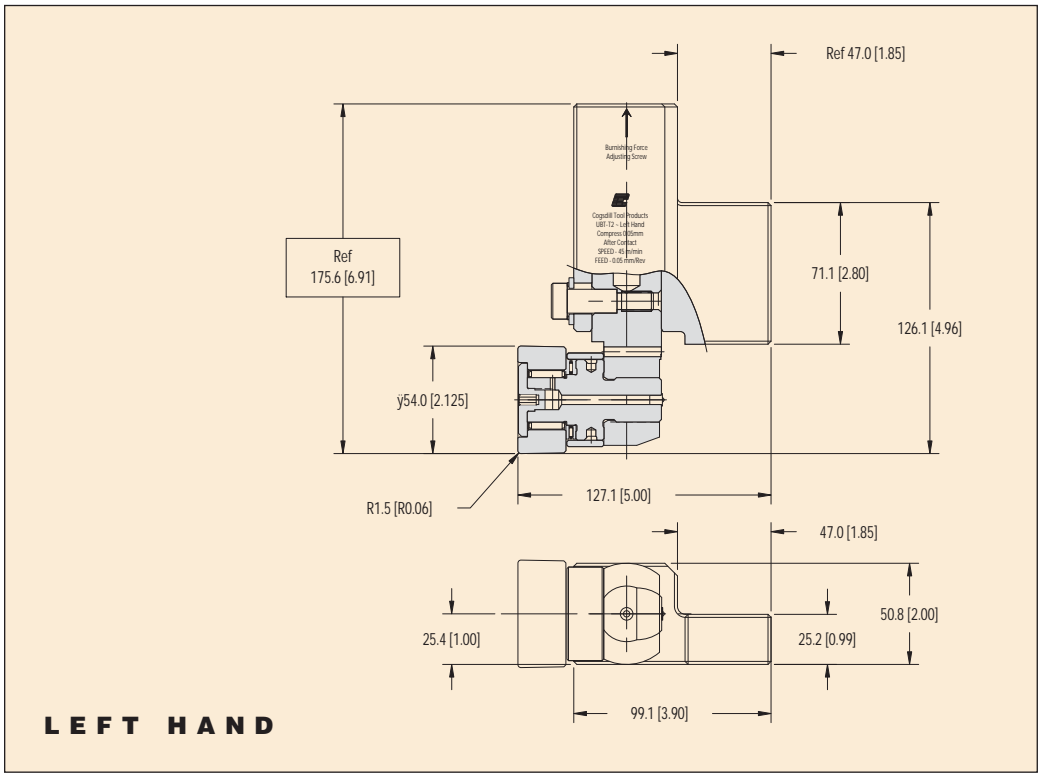


FOR

BURNISHING OUTSIDE
DIAMETERS, FACES,
TAPERS, AND
CONTOURS



Turning-holder style



UBT-T2



FOR

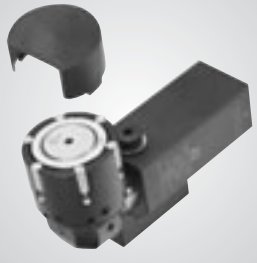
BURNISHING

OUTSIDE

DIAMETERS

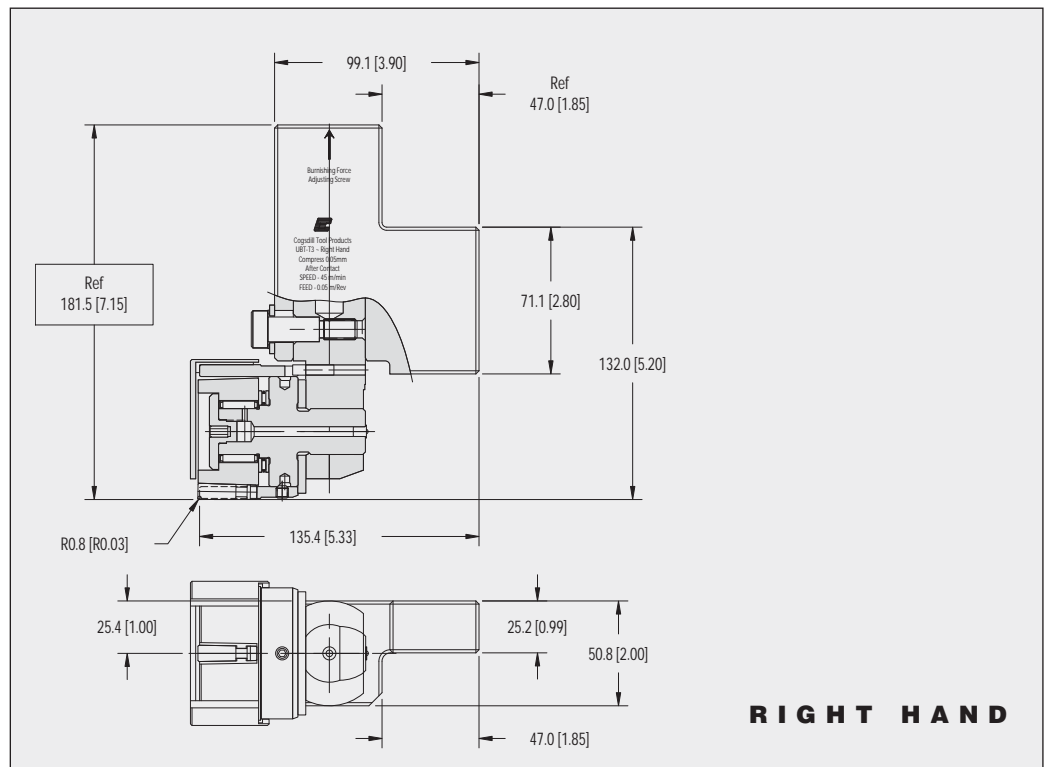
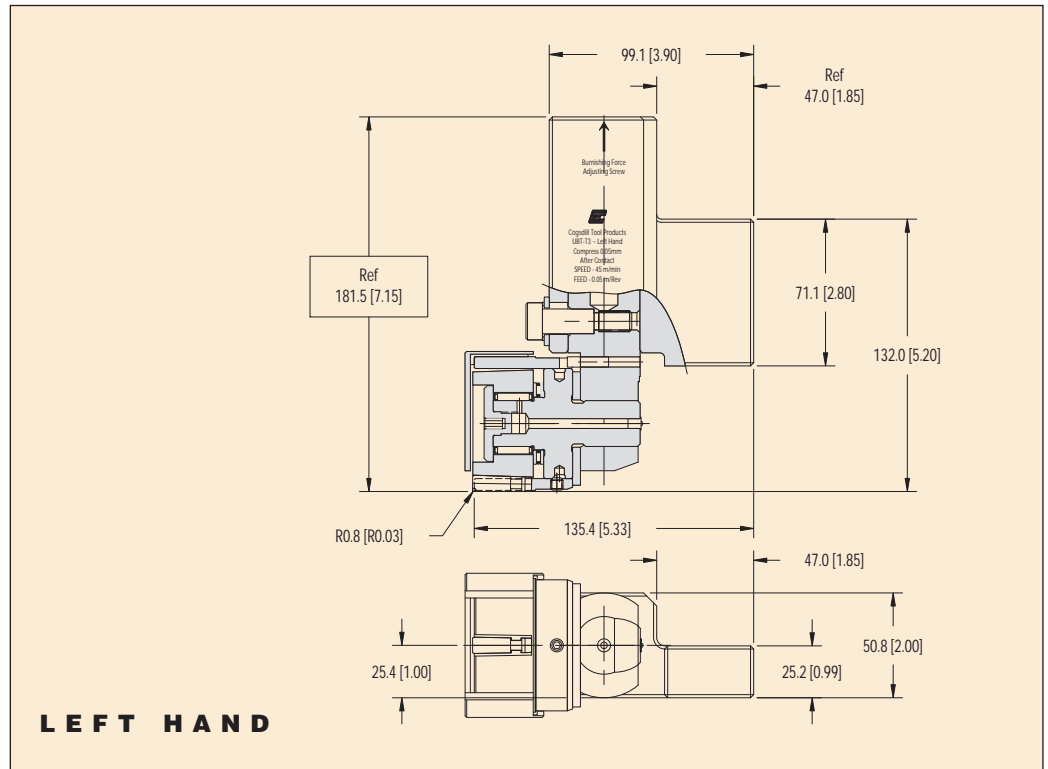
Turning-holder style

UBT-T3



FOR

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



Boring-bar style



UBT-B1



UBT-B2

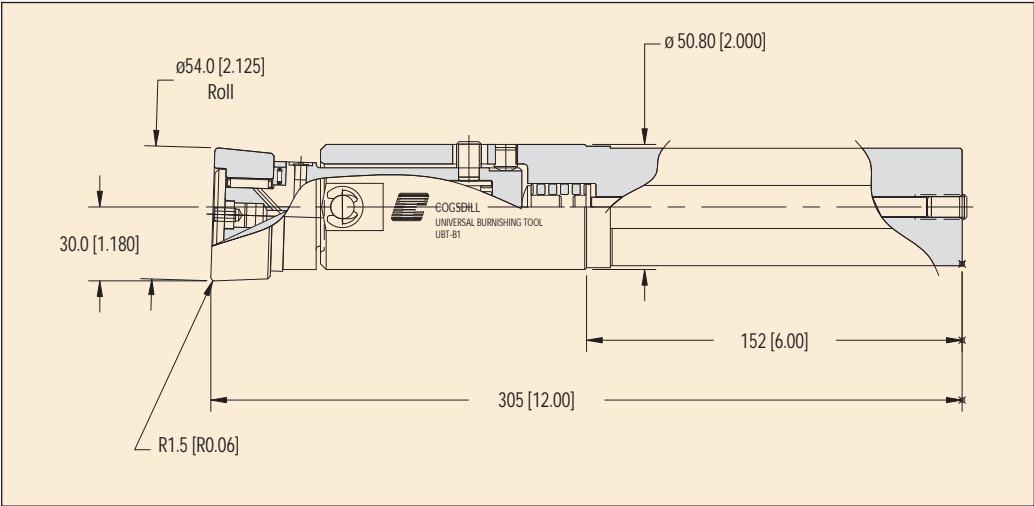


UBT-B3



Roll shield installed above

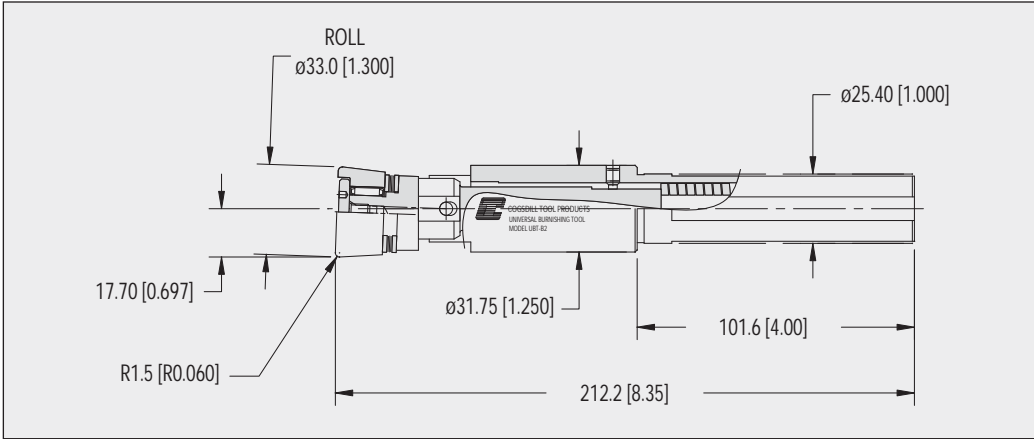
Boring-bar style



UBT-B1



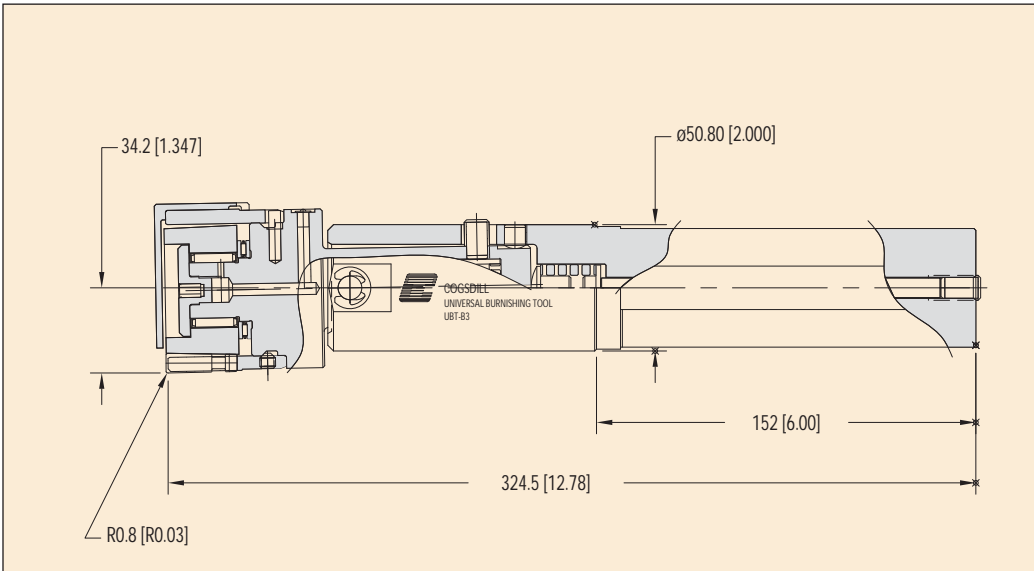
FOR BURNISHING
OUTSIDE DIAMETERS,
FACES, AND LARGE INSIDE
DIAMETERS (IDS GREATER
THAN 70mm/2.75 in.)



UBT-B2



A SMALLER VERSION
OF THE UBT-B1, FOR USE ON
SMALLER MACHINES AND IN
SMALLER BORES GREATER
THAN 38MM (1.5 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-T Tools

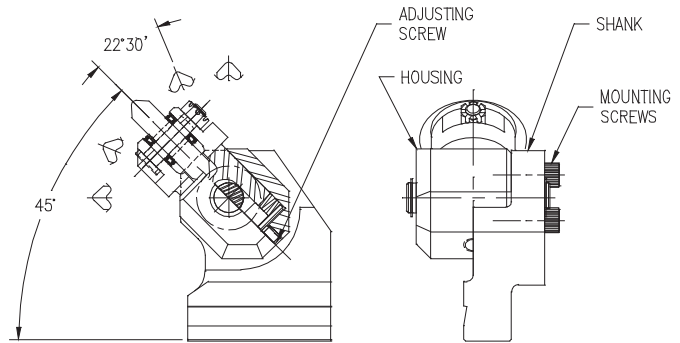
Note: UBT™ single-roll burnishing tools do not have the advantage of an overlapping effect as with multi-roll tools, and for this reason slower feed rates and/or multiple passes over the part may be required in order to produce the desired finish.

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*.

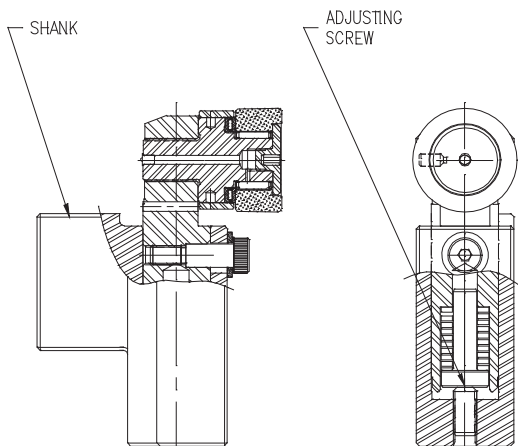


Left hand style shown

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

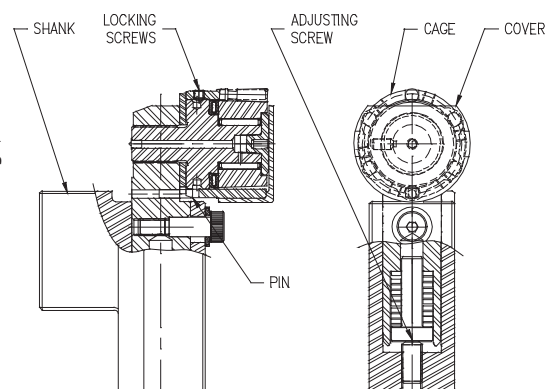
UBT-T3 tool set-up

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.

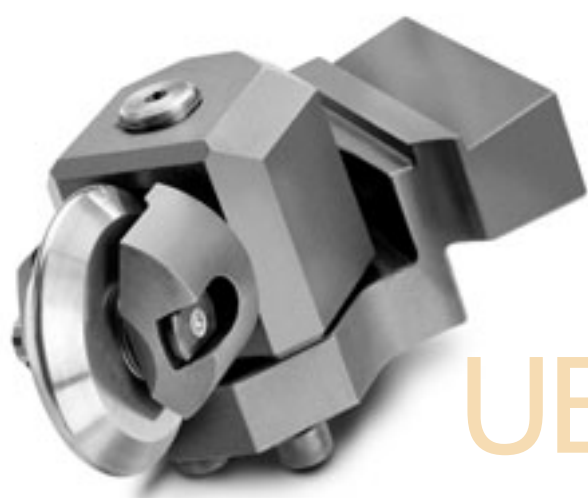
Adjustments can be made to the burnishing force to achieve optimum finish. Tighten the load *adjusting screw* clockwise to increase the burnishing force, six turns total, or counterclockwise to reduce the force.

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.)

ROLLS FOR UBT-T TOOLS

ITEM NO.	TOOL TYPE	ROLL TYPE & RADIUS
UBT-006	UBT-T1	HARDENED STEEL, .093 IN. (2.36MM)
UBT-007	UBT-T1	HARDENED STEEL, .030 IN. (0.76MM)
UBT-010	UBT-T1	CARBIDE, .093 IN. (2.36MM)
UBT-015	UBT-T2	HARDENED STEEL, .060 IN. (1.52MM)
UBT-016	UBT-T2	CARBIDE, .060 IN. (1.52MM)
6100-708-00312	UBT-T3	HARDENED STEEL, .030 IN. (0.76MM)

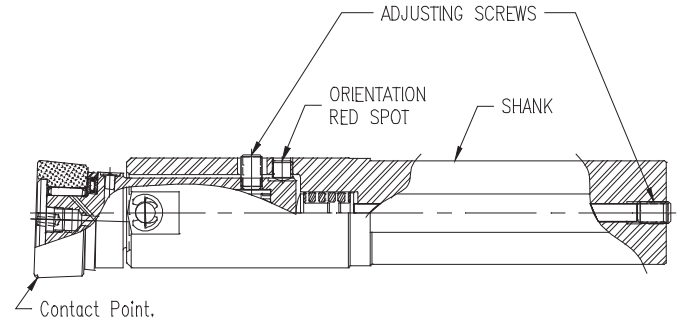
Set-up and operating instructions for UBT-B Tools

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.

UBTB1 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.

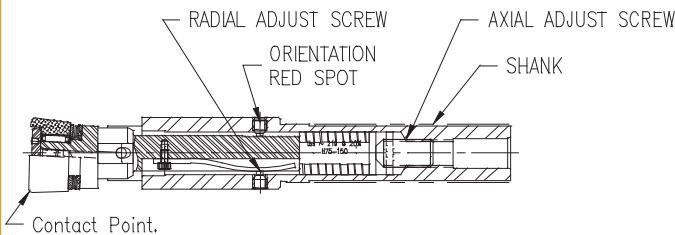


UBTB2 tool set-up

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.

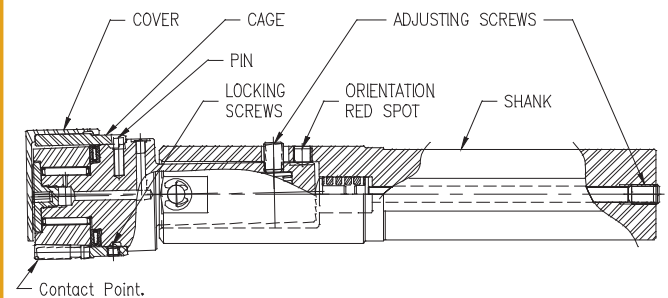


UBTB3 tool set-up

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.)

ROLLS FOR UBT-B TOOLS

ITEM NO.	TOOL TYPE	ROLL TYPE & RADIUS
UBT-001	UBT-B1	HARDENED STEEL, .060 IN. (1.52MM)
UBT-002	UBT-B1	CARBIDE, .060 IN. (1.52MM)
UBT-003	UBT-B1	HARDENED STEEL, .030 IN. (0.76MM)
UBT-018	UBT-B2	HARDENED STEEL, .060 IN. (1.52MM)
UBT-019	UBT-B2	CARBIDE, .060 IN. (1.52MM)
6100-708-00312	UBT-B3	HARDENED STEEL, .030 IN. (0.76MM)

Speed and feed recommendations for UBT-T and UBT-B tools

SPEED		FEED	
SFM	M/MIN.	IPR	MM/REV.
750	230	0.001/0.006	0.02/0.15

Lubrication of UBT-T and UBT-B tools

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

KB[®] knurling tools

*Salvage out-of-tolerance bores or shafts with the two-step **KB[®] Knurling-Burnishing** “scrap saver” process.*

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.



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.

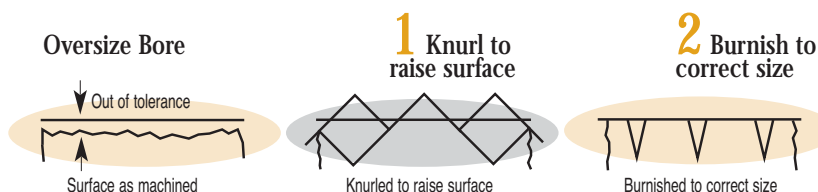
Knurling and Burnishing makes holding size easier; this results in savings in inspection time and scrap.

How it works

1 Knurl to raise surface
2 Burnish to correct size



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 .76mm (.030 inch) 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.

The KB process

Tool operation

Knurling may be performed with either the tool or the part rotating. Any ductile or malleable metal may be knurled including aluminum, brass, bronze, ductile iron, steels (up to 40 Rc) and cast iron (except chilled and white cast). Speeds should approximate drilling speeds, and feed rate starting points can be determined from the table below.

Although hand-fed operations are possible on many machines, power feeding is desirable to obtain a more uniform knurl pattern. Return feeds

may be two to three times the infeed rate.

The operations should be performed under a flood of coolant. A water soluble, high-lubricity oil is recommended. If coolant cannot be used, speeds and feeds should be reduced by two-thirds to ensure reasonable knurl and pin life.

The tools are adjusted using the adjusting screw located in the center of the tool.

Once the tools are set for size, an unskilled operator can obtain consistently good results, even over long work lengths.

Cogsdill knurling tools do not require accurate location, and in most cases it is recommended to have either the tool or part free to float. Each knurling roll depends on the support of the opposing roll to do its work; therefore, the tools are self-centering.

Typical changes in workpiece diameter, after knurling with medium pitch knurling rolls (20 teeth per circular inch), are as follows: for cast iron, .15mm (.006 inch); for steel, .2mm (.008 inch); for bronze, .25mm (.010 inch); and for aluminum, .30mm (.012 inch).

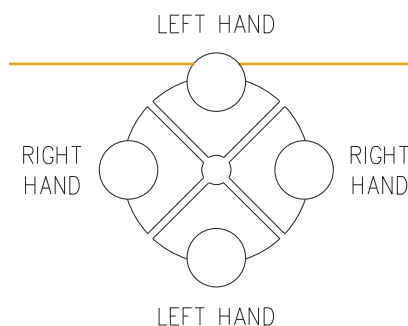
MATERIAL	SPEED		FEED RATE	
	SM/MIN	SFPM	MM/REV	IPR
Aluminum or brass	61-91	200-300	.76	.030
Leaded steel	38-46	125-150	.76	.030
Soft cast iron, carbon steel	24-37	80-120	.46	.018
# 50 cast iron, medium alloy steel	18-27	60-90	.30	.012
# 65 cast iron, alloy steel (35-40 R/C)	8-11	25-35	.20	.008

Knurling rolls

Worn knurling rolls should be replaced in sets. However, if a knurling roll should be damaged, it may be replaced by a new roll of like hand.

KN-1 and KN-2 knurling rolls are stocked in medium and coarse pitch; KN-3 rolls are stocked in medium

pitch only. (Medium is 20 teeth per circular inch, and coarse is 14 teeth per circular inch.) Please specify medium or coarse pitch when ordering. Standard knurling rolls have knurls set at a 45 degree angle. Special angles and pitches are available on special order.



Cogsdill Knurling Tools require an equal number of left and right hand knurling rolls, placed in opposing stations.

Special tools

Special Knurling Tools, including external tools, tools for larger diameters, and fully-bottoming tools, are available on special order. When requesting a quotation for a special tool, please furnish the following data:

1. Part description and part number (if any).
2. A blueprint or sketch of your part.
3. Exactly what job is to be performed; i.e. what particular surface of the part is to be knurled.
4. Material type and hardness.
5. If a salvage job is to be performed, advise how much parts are oversized or undersized.
6. Tolerance requirements.
7. Shank requirements.

Tool design

Standard Cogsdill Knurling Tools are available for internal applications. External tools are available on special order (see “Special Tools”). All standard internal Knurling Tools are of similar design with differences only in the number of knurling rolls and the diameter adjustment mechanism.

Small tools from KBN-625 through KBN-1156 are adjusted by turning a hex-head screw in the side of the tool. Tools in this range have two rolls.

The larger internal tools are adjusted by means of a hex-head screw through the center of the tool. The screw is accessible from the front of the tool.

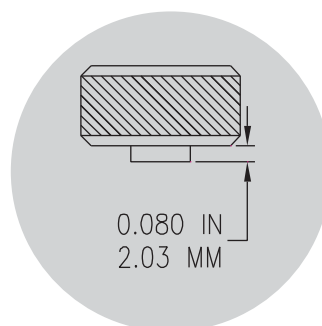
Tools from KBN-1188 through KBN-2926 have four knurling rolls, while those from KBN-3000 through KBN-4000 have six knurling rolls.

All internal Knurling Tools are adjustable over a range of .041 inch, as are Cogsdill Roll-a-Finish tools.

The tool consists of shank, rolls, pins and adjusting screw. Morse taper shanks are standard. The rolls and pins are the only items considered wear parts; these are available from stock. We recommend that at least one spare set of rolls and pins is ordered when a knurling tool is purchased. The pins are retained by a set screw and can be easily removed when it is necessary to replace worn rolls.

All standard tools are designed for through-hole applications. These tools can also be used on semi-bottoming applications; the tool will work to .080 inch (2.03mm) from the bottom of the bore. Bottoming tools are also available, on special order (see “Special Tools”).

knurling
tool
design



Standard tool specifications

Tool No.	Diameter Range		Shank	Overall Length		Pins & Knurls	
	Millimeters	Inches		MM	Inches	Size	Qty. Req.
KBN-625	15.77-16.81	.621-.662	↑	↑	↑	↑	↑
KBN-656	16.56-17.60	.652-.693				#KN-3	
KBN-688	17.37-18.42	.684-.725				7.93mm	
KBN-719	18.16-19.20	.715-.756				(.312 Inch)	
KBN-750	18.95-19.99	.746-.787				Dia	
KBN-781	19.74-20.78	.777-.818				↑	
KBN-812	20.52-21.56	.808-.849					
KBN-844	21.34-22.38	.840-.881					
KBN-875	22.12-23.16	.871-.912					2
KBN-906	22.91-23.95	.902-.943					
KBN-938	23.72-24.77	.934-.975					
KBN-969	24.51-25.55	.965-1.006					
KBN-1000	25.30-26.34	.996-1.037					
KBN-1031	26.09-27.13	1.027-1.068					
KBN-1062	26.87-27.91	1.058-1.099					
KBN-1094	27.69-28.73	1.090-1.131					
KBN-1125	28.47-29.51	1.121-1.162	#2MT	171.4	6.75		
KBN-1156	29.26-30.30	1.152-1.193					↓
KBN-1188	30.07-31.12	1.184-1.225					↑
KBN-1219	30.86-31.90	1.215-1.256					
KBN-1250	31.65-32.69	1.246-1.287					
KBN-1281	32.44-33.48	1.277-1.318					
KBN-1312	33.22-34.26	1.308-1.349					
KBN-1344	34.04-35.08	1.340-1.381				#KN-2	
KBN-1375	34.82-35.86	1.371-1.412				9.53mm	
KBN-1406	35.61-36.65	1.402-1.443				(.375 Inch)	
KBN-1438	36.42-37.47	1.434-1.475				Dia	
KBN-1469	37.21-38.25	1.465-1.506					
KBN-1500	38.00-39.04	1.496-1.537					
KBN-1531	38.79-39.83	1.527-1.568					
KBN-1562	39.57-40.61	1.558-1.599					4
KBN-1594	40.39-41.43	1.590-1.631					
KBN-1625	41.17-42.21	1.621-1.662					
KBN-1656	41.96-43.00	1.652-1.693	↓	↓	↓		
KBN-1688	42.77-43.82	1.684-1.725	↑	↑	↑		
KBN-1719	43.56-44.60	1.715-1.756					
KBN-1750	44.35-45.39	1.746-.1.787					
KBN-1781	45.14-46.18	1.777-1.818					
KBN-1812	45.92-46.96	1.808-1.849					
KBN-1844	46.74-47.78	1.840-1.881				↓	
KBN-1875	47.52-48.56	1.871-1.912				↑	
KBN-1906	48.31-49.35	1.902-1.943					
KBN-1938	49.12-50.17	1.934-1.975					
KBN-1969	49.91-50.95	1.965-2.006	#3MT	196.8	7.75		
KBN-2000	50.70-51.74	1.996-2.037					
KBN-2031	51.49-52.53	2.027-2.068					
KBN-2062	52.27-53.31	2.058-2.099				#KN-1	
KBN-2094	53.09-54.13	2.090-2.131				19.05mm	
KBN-2125	53.87-54.91	2.121-2.162				(.750 Inch)	
KBN-2156	54.66-55.70	2.152-2.193				Dia	
KBN-2188	55.47-56.52	2.184-2.225					
KBN-2219	56.26-57.30	2.215-2.256					
KBN-2250	57.05-58.09	2.246-2.287					
KBN-2281	57.84-58.88	2.277-2.318					
KBN-2312	58.62-59.66	2.308-2.349	↓	↓	↓	↓	↓

Standard tool specifications

Tool No.	Diameter Range		Shank	Overall Length		Pins & Knurls	
	Millimeters	Inches		MM	Inches	Size	Qty. Req.
KBN-2344	59.44-60.48	2.340-2.381	↑	↑	↑	↑	↑
KBN-2375	60.22-61.26	2.371-2.412					
KBN-2406	61.01-62.05	2.402-2.443					
KBN-2438	61.82-62.87	2.434-2.475					
KBN-2469	62.61-63.65	2.465-2.506					
KBN-2500	63.40-64.44	2.496-2.537					
KBN-2531	64.19-65.23	2.527-2.568					
KBN-2562	64.97-66.01	2.558-2.599					
KBN-2594	65.79-66.83	2.590-2.631					
KBN-2625	66.57-67.61	2.621-2.662	#3MT	196.8	7.75		4
KBN-2656	67.36-68.40	2.652-2.693					
KBN-2688	68.17-69.22	2.684-2.725					
KBN-2719	68.96-70.00	2.715-2.756					
KBN-2750	69.75-70.79	2.746-2.787					
KBN-2781	70.54-71.58	2.777-2.818					
KBN-2812	71.32-72.36	2.808-2.849					
KBN-2844	72.14-73.18	2.840-2.881					
KBN-2875	72.92-73.96	2.871-2.912					
KBN-2906	73.71-74.75	2.902-2.943					
KBN-2938	74.52-75.57	2.934-2.975					
KBN-2969	75.31-76.35	2.965-3.006	↓	↓	↓		↓
KBN-3000	76.10-77.14	2.996-3.037	↑	↑	↑		↑
KBN-3031	76.89-77.93	3.027-3.068					
KBN-3062	77.67-78.71	3.058-3.099					
KBN-3094	78.49-79.53	3.090-3.131					
KBN-3125	79.27-80.31	3.121-3.162					
KBN-3156	80.06-81.10	3.152-3.193					
KBN-3188	80.87-81.92	3.184-3.225					
KBN-3219	81.66-82.70	3.215-3.256				#KN-1	
KBN-3250	82.45-83.49	3.246-3.287				19.05mm	
KBN-3281	83.24-84.28	3.277-3.318				(.750 Inch)	
KBN-3312	84.02-85.06	3.308-3.349				Dia.	
KBN-3344	84.84-85.88	3.340-3.381					
KBN-3375	85.62-86.66	3.371-3.412					
KBN-3406	86.41-87.45	3.402-3.443					
KBN-3438	87.22-88.27	3.434-3.475					
KBN-3469	88.01-89.05	3.465-3.506	#4MT	222.2	8.75		6
KBN-3500	88.80-89.84	3.496-3.537					
KBN-3531	89.59-90.63	3.527-3.568					
KBN-3562	90.37-91.41	3.558-3.599					
KBN-3594	91.19-92.23	3.590-3.631					
KBN-3625	91.97-93.01	3.621-3.662					
KBN-3656	92.73-93.80	3.652-3.693					
KBN-3688	93.57-94.62	3.684-3.725					
KBN-3719	94.36-95.40	3.715-3.756					
KBN-3750	95.15-96.19	3.746-3.787					
KBN-3781	95.94-96.98	3.777-3.818					
KBN-3812	96.72-97.76	3.808-3.849					
KBN-3844	97.54-98.58	3.840-3.881					
KBN-3875	98.32-99.36	3.871-3.912					
KBN-3906	99.11-100.15	3.902-3.943					
KBN-3938	99.92-100.97	3.934-3.975					
KBN-3969	100.71-100.97	3.965-4.006					
KBN-4000	101.50-102.54	3.996-4.037					
			↓	↓	↓	↓	↓



COGSDILL-NUNEATON Ltd.

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 _____ COUNTY _____ POSTAL CODE _____

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 024 76344433

Cogsdill-Nuneaton Ltd.

Tenlons Road

Nuneaton, England

ATTN: CUSTOMER SERVICE

IMPORTANT

PART PRINT OR
DETAILED SKETCH
MUST BE SUPPLIED.

Notes

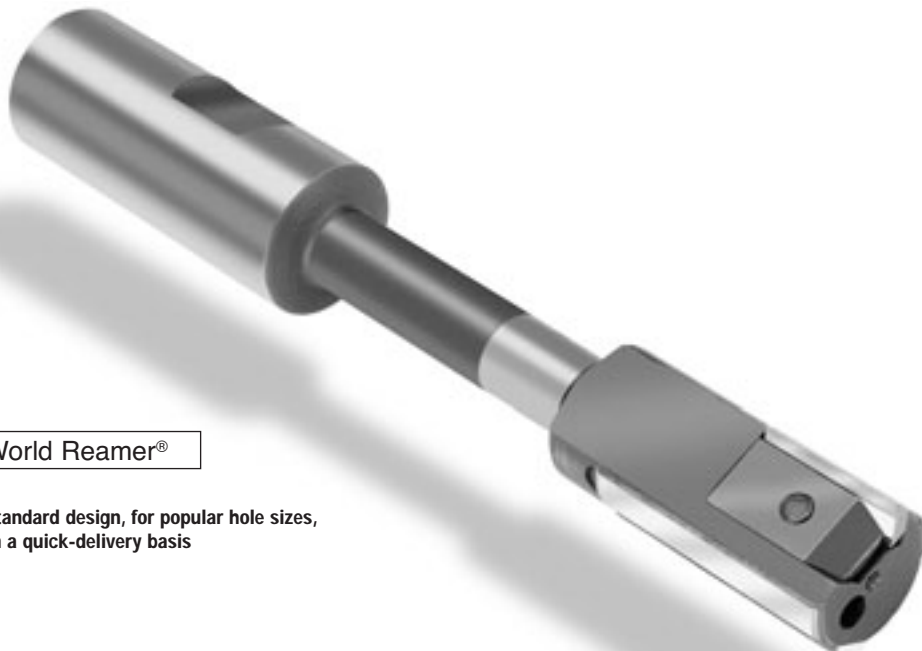
Other hole-finishing solutions from Cogsdill

In addition to burnishing tools and machines, Cogsdill also offers Shefcut® precision reaming and boring tools. Like burnishing tools, Shefcut provides accurate size and fine finish, but also enables the user to achieve superior bore geometry, and accurate bore location where required. Ask for our full catalog or view it on our Website at www.cogsdill.com.



Shefcut® precision boring tool

Custom tool designs to
suit the application



Shefcut® World Reamer®

Tools of a standard design, for popular hole sizes,
available on a quick-delivery basis