

External Roll-a-Finish[®] tools

AEX series

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



AEX-1

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

Offered in three styles:

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

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

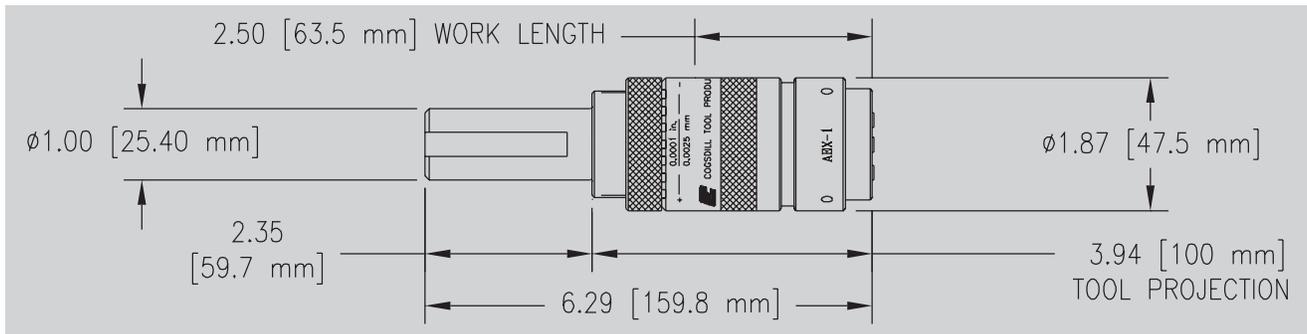


AEX-2



AEX-3

Standard tool specifications

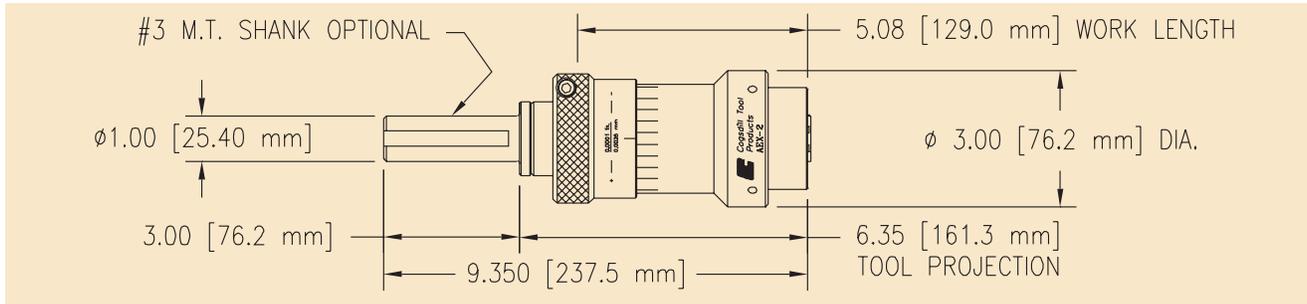


"AEX-1" SERIES ROLL-A-FINISH® TOOLS .062 TO .625 IN. (1.57 TO 15.88 MM)

DIAMETER RANGE		TOOL NUMBER
INCHES	MM	BOTTOMING (NO HELIX)
.043-.064	1.09-1.63	AEX-1-062
.059-.080	1.50-2.03	AEX-1-078
.075-.096	1.91-2.44	AEX-1-094
.090-.111	2.29-2.82	AEX-1-109
.106-.127	2.69-3.23	AEX-1-125
.122-.143	3.10-3.63	AEX-1-141
.137-.158	3.48-4.01	AEX-1-156
.152-.173	3.86-4.39	AEX-1-171
.168-.189	4.27-4.80	AEX-1-187
.184-.205	4.67-5.21	AEX-1-203
.200-.221	5.08-5.61	AEX-1-219
.215-.236	5.46-5.99	AEX-1-234
.231-.252	5.87-6.40	AEX-1-250
.247-.268	6.27-6.81	AEX-1-266
.262-.283	6.65-7.19	AEX-1-281
.278-.299	7.06-7.59	AEX-1-297
.293-.314	7.44-7.98	AEX-1-312
.309-.330	7.85-8.38	AEX-1-328
.325-.346	8.26-8.79	AEX-1-344
.340-.361	8.64-9.17	AEX-1-359
.356-.377	9.04-9.58	AEX-1-375
.372-.393	9.49-9.98	AEX-1-391
.387-.408	9.83-10.36	AEX-1-406
.403-.424	10.24-10.77	AEX-1-422
.418-.439	10.62-11.15	AEX-1-438
.434-.455	11.02-11.56	AEX-1-453
.450-.471	11.43-11.96	AEX-1-469
.465-.486	11.81-12.34	AEX-1-484
.481-.502	12.22-12.75	AEX-1-500
.497-.518	12.62-13.16	AEX-1-516
.512-.533	13.00-13.54	AEX-1-531
.528-.549	13.41-13.94	AEX-1-547
.543-.564	13.79-14.33	AEX-1-562
.559-.580	14.20-14.73	AEX-1-578
.575-.596	14.61-15.14	AEX-1-594
.590-.611	14.99-15.52	AEX-1-609
.606-.627	15.39-15.93	AEX-1-625

Shanks other than shown above are available upon request.

Standard tool specifications

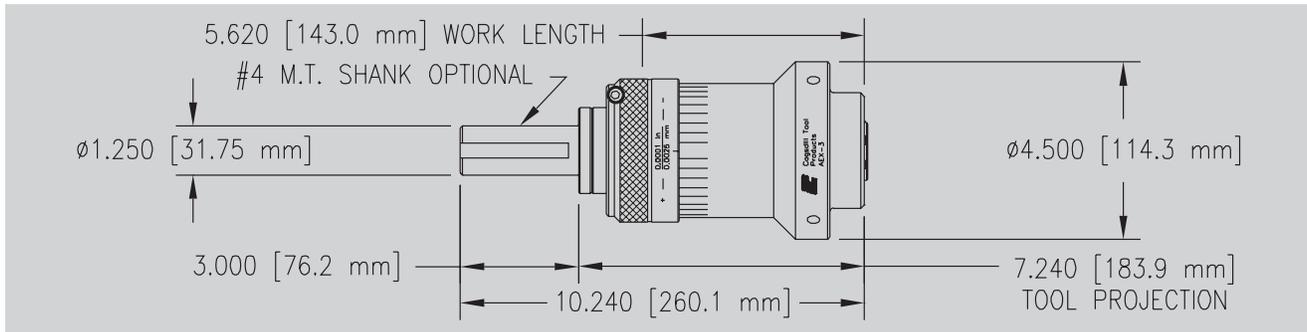


"AEX-2" SERIES ROLL-A-FINISH® TOOLS .062 TO 1.000 IN. (1.57 TO 25.4 MM)

DIAMETER RANGE		TOOL NUMBER	
INCHES	MM	MACHINE-FEED (NO HELIX)	BOTTOMING (NO HELIX)
.045-.066	1.14-1.68	AEX-2-062	AEXB-2-062
.061-.082	1.57-2.08	AEX-2-078	AEXB-2-078
.077-.098	1.96-2.49	AEX-2-094	AEXB-2-094
.092-.113	2.34-2.87	AEX-2-109	AEXB-2-109
.108-.129	2.74-3.28	AEX-2-125	AEXB-2-125
.124-.145	3.15-3.68	AEX-2-141	AEXB-2-141
.139-.160	3.53-4.06	AEX-2-156	AEXB-2-156
.154-.175	3.91-4.45	AEX-2-171	AEXB-2-171
.170-.191	4.32-4.85	AEX-2-187	AEXB-2-187
.186-.207	4.72-5.26	AEX-2-203	AEXB-2-203
.202-.223	5.13-5.66	AEX-2-219	AEXB-2-219
.217-.238	5.51-6.05	AEX-2-234	AEXB-2-234
.233-.254	5.92-6.45	AEX-2-250	AEXB-2-250
.249-.270	6.32-6.86	AEX-2-266	AEXB-2-266
.264-.285	6.71-7.24	AEX-2-281	AEXB-2-281
.280-.301	7.11-7.65	AEX-2-297	AEXB-2-297
.295-.316	7.49-8.03	AEX-2-312	AEXB-2-312
.311-.332	7.90-8.43	AEX-2-328	AEXB-2-328
.327-.348	8.31-8.84	AEX-2-344	AEXB-2-344
.342-.363	8.69-9.22	AEX-2-359	AEXB-2-359
.358-.379	9.09-9.63	AEX-2-375	AEXB-2-375
.374-.395	9.50-10.03	AEX-2-391	AEXB-2-391
.389-.410	9.88-10.41	AEX-2-406	AEXB-2-406
.405-.426	10.29-10.82	AEX-2-422	AEXB-2-422
.420-.441	10.67-11.20	AEX-2-438	AEXB-2-438
.436-.457	11.07-11.61	AEX-2-453	AEXB-2-453
.452-.473	11.48-12.01	AEX-2-469	AEXB-2-469
.467-.488	11.86-12.40	AEX-2-484	AEXB-2-484
.483-.504	12.27-12.80	AEX-2-500	AEXB-2-500
.499-.520	12.67-13.21	AEX-2-516	AEXB-2-516
.514-.535	13.06-13.59	AEX-2-531	AEXB-2-531
.530-.551	13.46-14.00	AEX-2-547	AEXB-2-547
.545-.566	13.84-14.38	AEX-2-562	AEXB-2-562
.561-.582	14.25-14.78	AEX-2-578	AEXB-2-578
.577-.598	14.66-15.19	AEX-2-594	AEXB-2-594
.592-.613	15.04-15.57	AEX-2-609	AEXB-2-609
.608-.629	15.44-15.98	AEX-2-625	AEXB-2-625
.624-.645	15.85-16.38	AEX-2-641	AEXB-2-641
.639-.660	16.23-16.76	AEX-2-656	AEXB-2-656
.655-.676	16.64-17.17	AEX-2-672	AEXB-2-672
.671-.692	17.04-17.58	AEX-2-688	AEXB-2-688
.686-.707	17.42-17.96	AEX-2-703	AEXB-2-703
.702-.723	17.83-18.36	AEX-2-719	AEXB-2-719
.717-.738	18.21-18.75	AEX-2-734	AEXB-2-734
.733-.754	18.62-19.15	AEX-2-750	AEXB-2-750
.749-.770	19.02-19.56	AEX-2-766	AEXB-2-766
.764-.785	19.41-19.94	AEX-2-781	AEXB-2-781
.780-.801	19.81-20.35	AEX-2-797	AEXB-2-797
.795-.816	20.19-20.73	AEX-2-812	AEXB-2-812
.811-.832	20.60-21.13	AEX-2-828	AEXB-2-828
.827-.848	21.00-21.54	AEX-2-844	AEXB-2-844
.842-.863	21.39-21.92	AEX-2-859	AEXB-2-859
.858-.879	21.79-22.33	AEX-2-875	AEXB-2-875
.874-.895	22.20-22.73	AEX-2-891	AEXB-2-891
.889-.910	22.58-23.11	AEX-2-906	AEXB-2-906
.905-.926	22.99-23.52	AEX-2-922	AEXB-2-922
.921-.942	23.39-23.93	AEX-2-938	AEXB-2-938
.936-.957	23.77-24.31	AEX-2-953	AEXB-2-953
.952-.973	24.18-24.71	AEX-2-969	AEXB-2-969
.967-.988	24.56-25.10	AEX-2-984	AEXB-2-984
.983-1.004	24.97-25.50	AEX-2-1000	AEXB-2-1000

Shanks other than shown above are available upon request.

Standard tool specifications



"AEX-3" SERIES ROLL-A-FINISH®TOOLS 1.016 TO 2.000 IN. (25.8 TO 50.8 MM)

DIAMETER RANGE		TOOL NUMBER	
INCHES	MM	MACHINE-FEED (NO HELIX)	BOTTOMING (NO HELIX)
.999-1.020	25.37-25.91	AEX-3-1016	AEXB-3-1016
1.014-1.035	25.76-26.29	AEX-3-1031	AEXB-3-1031
1.030-1.051	26.16-26.70	AEX-3-1047	AEXB-3-1047
1.045-1.066	26.54-27.08	AEX-3-1062	AEXB-3-1062
1.061-1.082	26.95-27.48	AEX-3-1078	AEXB-3-1078
1.077-1.098	27.36-27.89	AEX-3-1094	AEXB-3-1094
1.092-1.113	27.74-28.27	AEX-3-1109	AEXB-3-1109
1.108-1.129	28.14-28.68	AEX-3-1125	AEXB-3-1125
1.124-1.145	28.55-29.08	AEX-3-1141	AEXB-3-1141
1.139-1.160	28.93-29.46	AEX-3-1156	AEXB-3-1156
1.155-1.176	29.34-29.87	AEX-3-1172	AEXB-3-1172
1.170-1.191	29.72-30.25	AEX-3-1188	AEXB-3-1188
1.186-1.207	30.12-30.66	AEX-3-1203	AEXB-3-1203
1.202-1.223	30.53-31.06	AEX-3-1219	AEXB-3-1219
1.217-1.238	30.91-31.45	AEX-3-1234	AEXB-3-1234
1.233-1.254	31.32-31.85	AEX-3-1250	AEXB-3-1250
1.249-1.270	31.72-32.26	AEX-3-1266	AEXB-3-1266
1.264-1.285	32.11-32.69	AEX-3-1281	AEXB-3-1281
1.280-1.301	32.51-33.05	AEX-3-1297	AEXB-3-1297
1.295-1.316	32.89-33.43	AEX-3-1312	AEXB-3-1312
1.311-1.332	33.30-33.83	AEX-3-1328	AEXB-3-1328
1.327-1.348	33.71-34.24	AEX-3-1344	AEXB-3-1344
1.342-1.363	34.09-34.62	AEX-3-1359	AEXB-3-1359
1.358-1.379	34.49-35.03	AEX-3-1375	AEXB-3-1375
1.374-1.395	34.90-35.43	AEX-3-1391	AEXB-3-1391
1.389-1.410	35.28-35.81	AEX-3-1406	AEXB-3-1406
1.405-1.426	35.69-36.22	AEX-3-1422	AEXB-3-1422
1.420-1.441	36.07-36.60	AEX-3-1438	AEXB-3-1438
1.436-1.457	36.47-37.01	AEX-3-1453	AEXB-3-1453
1.452-1.473	36.88-37.41	AEX-3-1469	AEXB-3-1469
1.467-1.488	37.26-37.80	AEX-3-1484	AEXB-3-1484
1.483-1.504	37.67-38.20	AEX-3-1500	AEXB-3-1500
1.499-1.520	38.07-38.61	AEX-3-1516	AEXB-3-1516
1.514-1.535	38.46-38.99	AEX-3-1531	AEXB-3-1531
1.530-1.551	38.86-39.40	AEX-3-1547	AEXB-3-1547
1.545-1.566	39.24-39.78	AEX-3-1562	AEXB-3-1562
1.561-1.582	39.65-40.18	AEX-3-1578	AEXB-3-1578
1.577-1.598	40.06-40.59	AEX-3-1594	AEXB-3-1594
1.592-1.613	40.44-40.97	AEX-3-1609	AEXB-3-1609
1.608-1.629	40.84-41.38	AEX-3-1625	AEXB-3-1625
1.619-1.660	41.12-42.16	AEX-3-1656	AEXB-3-1656
1.651-1.692	41.94-42.98	AEX-3-1688	AEXB-3-1688
1.682-1.723	42.72-43.76	AEX-3-1719	AEXB-3-1719
1.713-1.754	43.51-44.55	AEX-3-1750	AEXB-3-1750
1.744-1.785	44.30-45.34	AEX-3-1781	AEXB-3-1781
1.775-1.816	45.09-46.13	AEX-3-1812	AEXB-3-1812
1.807-1.848	45.90-46.94	AEX-3-1844	AEXB-3-1844
1.838-1.879	46.69-47.73	AEX-3-1875	AEXB-3-1875
1.869-1.910	47.47-48.51	AEX-3-1906	AEXB-3-1906
1.901-1.942	48.29-49.33	AEX-3-1938	AEXB-3-1938
1.932-1.973	49.07-50.11	AEX-3-1969	AEXB-3-1969
1.963-2.004	49.86-50.90	AEX-3-2000	AEXB-3-2000

Shanks other than shown above are available upon request.

Selection & ordering information

Internal Roll-a-Finish® tools

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

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

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

External Roll-a-Finish® tools

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

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

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

Replacement parts

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

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

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

NOTE: Use cage marking to establish nominal tool size.

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

Bearingizing tools

For tool selection and ordering information for Bearingizing tools and replacement parts, please refer to page 22.

to order



Part preparation & operating parameters for roller burnishing

Note

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

Machines

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

Material

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

Part preparation

Proper part preparation is essential to obtain optimum results from roller burnishing. Due to the fact that no metal is removed in the process, finish depends upon the existence of a uniform and tearfree surface which will be caused to flow under the pressure exerted through the rolls. An 80-120 microinch surface (2 - 3 micrometers), which is typical of boring or turning, is considered an ideal surface for roller burnishing. This relatively rough prefinish allows the Roll-a-Finish tool to displace a greater amount of material on the surface of the workpiece. It also allows the prefinish tolerance to be much greater than with a smoother prefinish. A smoother prefinish reduces the roller burnishing effect, which means the prefinished size must be much closer to the acceptable tolerance. The ideal 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.



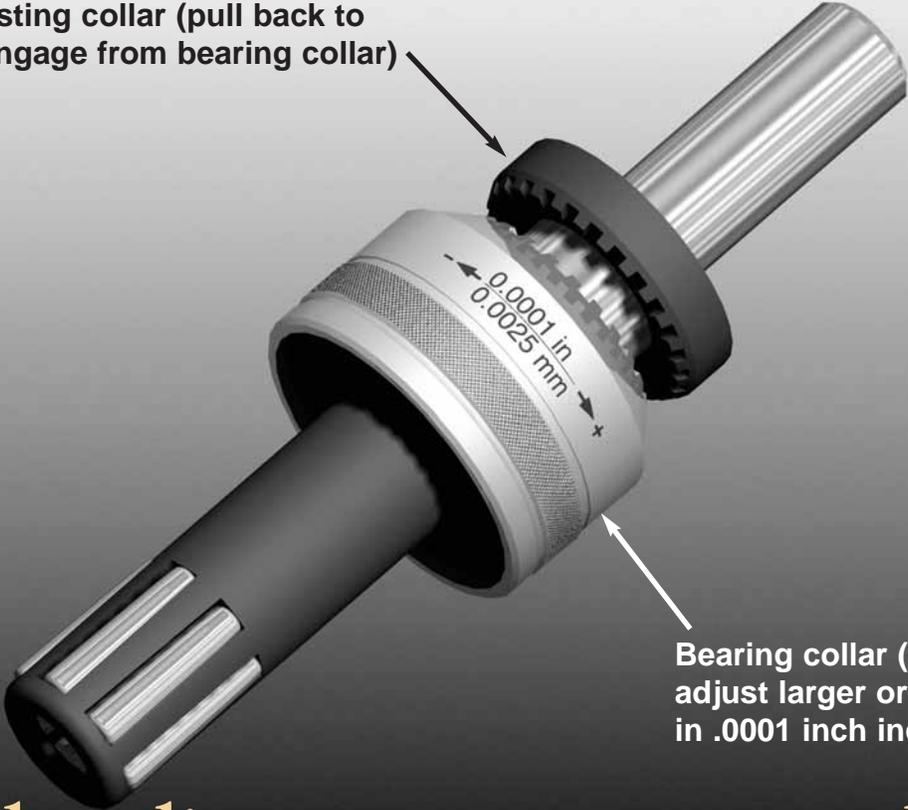
Part preparation & operating parameters for roller burnishing

Tool adjustment procedure

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

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

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



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

tool adjustment procedure

Part preparation & operating parameters for roller burnishing

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

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

Stock displacement

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

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

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

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

Tool operation

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

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

When the Roll-a-Finish tool reaches the end of the desired roller burnishing length, pull the tool from the bore. 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 "R"-style tools from .500 to 1.000 inch (12.7 to 25.4mm) have a common adjustment assembly.

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

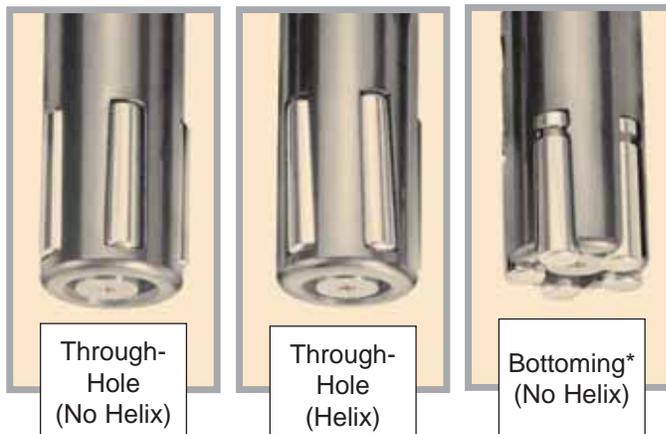
Speed and feed recommendations for internal Roll-a-Finish tools with self-feeding cages ⁽¹⁾

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

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

(2) Feed rate for external tools is 2.5 times the feed rate shown at left.

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

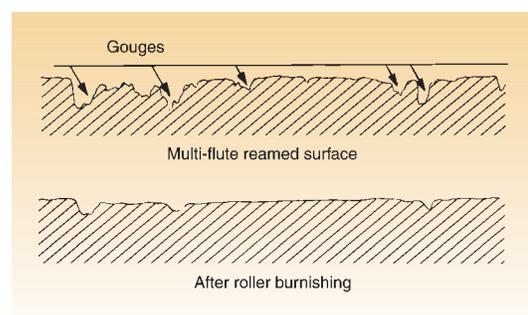
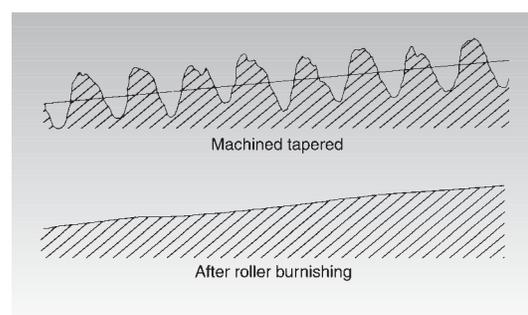
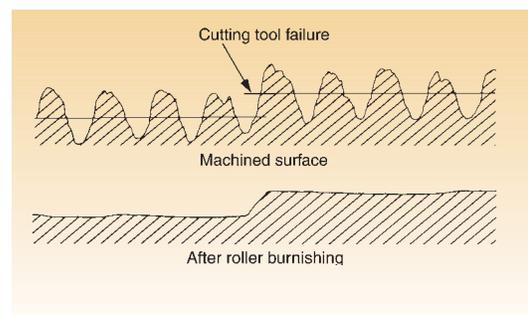


*Mandrel may be cut off if it does not allow full bottoming.

Part preparation & operating parameters for roller burnishing

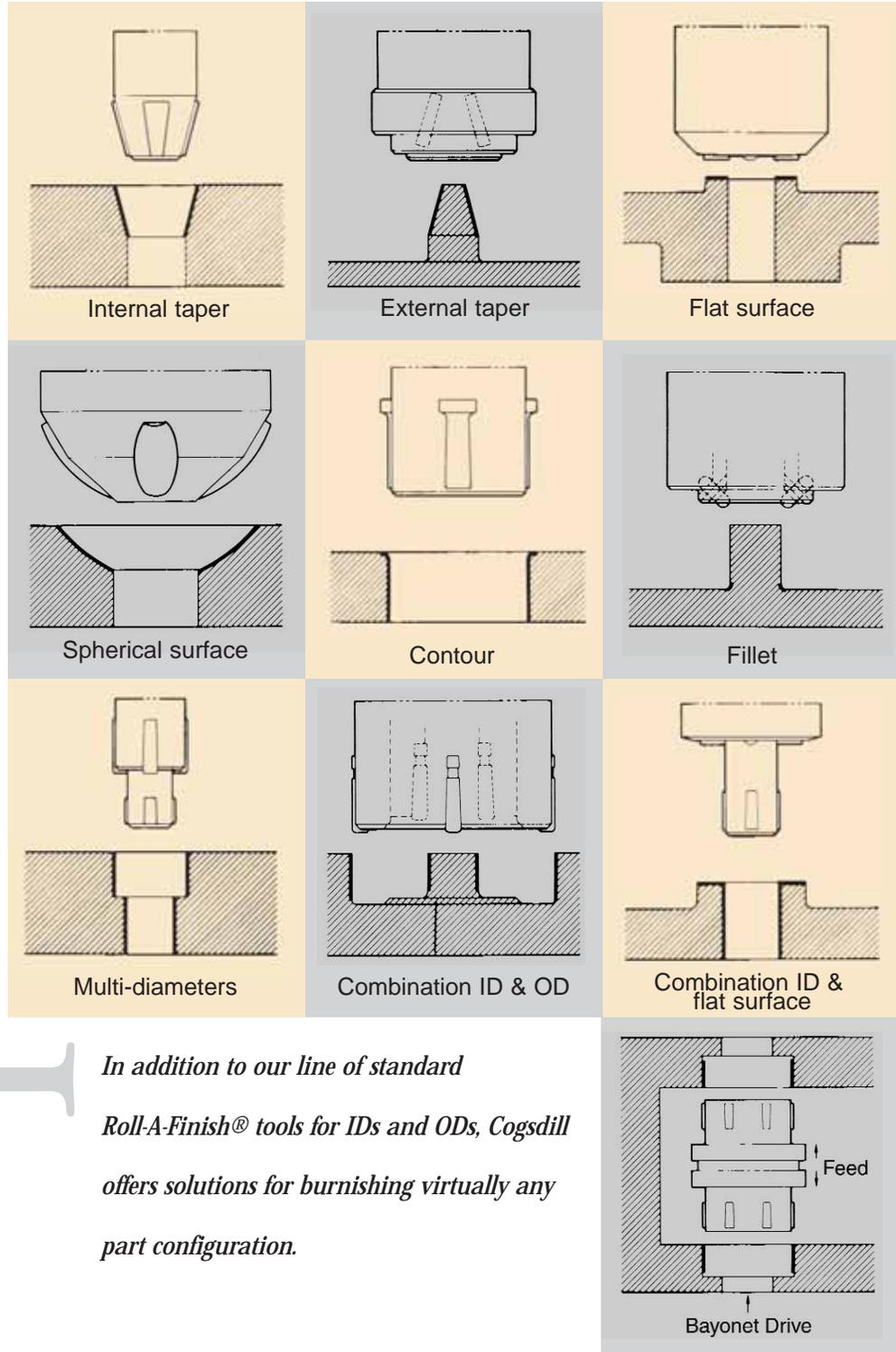
TROUBLE-SHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSE	SOLUTION
1. FINISH		
A. Scratches	Foreign material Worn rolls.	Clean filter coolant. Inspect – Replace if discolored or marred.
B. Flaking.	Too much interference. Too much friction.	Adjust for less interference More lubricity in coolant.
C. Spiral marks.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

Effects of poorly machined surfaces on burnishing



Special applications & tool designs

Specials



In addition to our line of standard Roll-A-Finish® tools for IDs and ODs, 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:



Internal taper tool

Flat surface tool

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



Air-actuated compensating tool

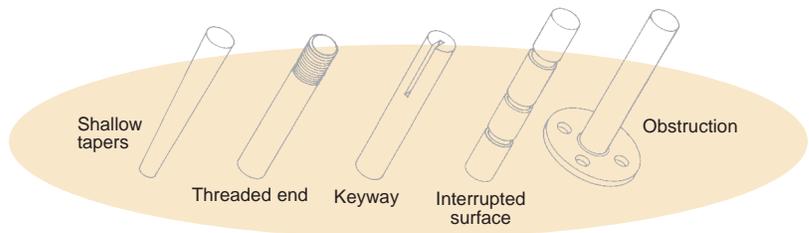
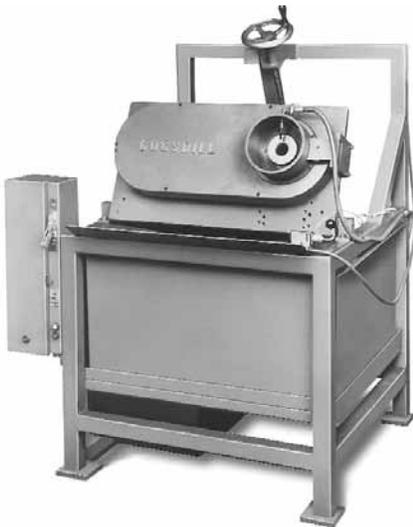
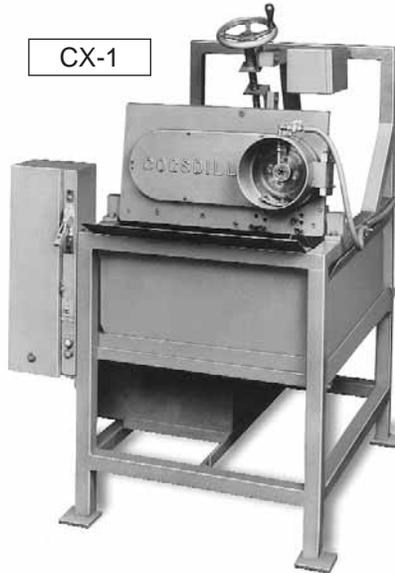
Expander tool

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

External roller burnishing machines

CX[®] machines

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. Model options range from compact models designed for portability to rugged high production models. 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 39, "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 .0001 inch (.0025mm) are attainable, depending on variables such as material type, hardness, pre-machining method, and the finish on the part prior to burnishing. A prepared tolerance of .002 inch (.05mm) can usually be reduced by 50 % (.001 inch /.02mm).

Low micro finishing

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

Work hardening

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

Appearance improvement

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

Fast processing

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

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

Adjustability

Race assemblies, the working components of the CX machine, are designed to process specific nominal size workpieces. CX-1 race assemblies are adjustable in increments of .0001 inch (.0025mm) over a range of .021 inch (.53mm) for each nominal size. CX-2 race assemblies are adjustable in increments of .0002 inch (.0051mm) over a range of .041 inch (1.04mm) for each nominal size (see page 38 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 .045 to .625 inch (1.14 to 16.87mm) in seconds. This inexpensive machine is light and compact — a real space saver — and easily portable (only 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.

Height: 20 inches (508mm)
Width: 13 inches (330mm)
Depth: 16 inches (406mm)



CX-M

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 150 lbs and occupying less than 3.5 cubic feet (.099 cubic meters) 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.

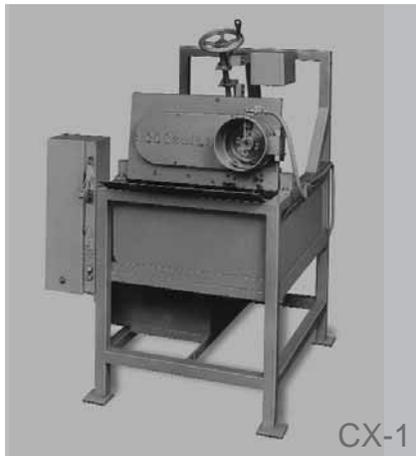
The CX-1T processes parts ranging from .045 to 1.004 inches (1.143 to 25.502mm) in diameter.

CX-1

The CX-1 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-1 is specifically designed for rugged high production use.

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

Height: 64 inches (1626mm)
Width: 40 inches (1016mm)
Depth: 42 inches (1069mm)



CX-1



CX-1T

CX-2

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

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

Height: 67 inches (1702mm)
Width: 50 inches (1270mm)
Depth: 45 inches (1143mm)



CX-2

Height: 16 inches (406mm)
Width: 31 inches (787mm)
Depth: 17 inches (432mm)

CX[®] External roller burnishing machines

CX sub-assembly options

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

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

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

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

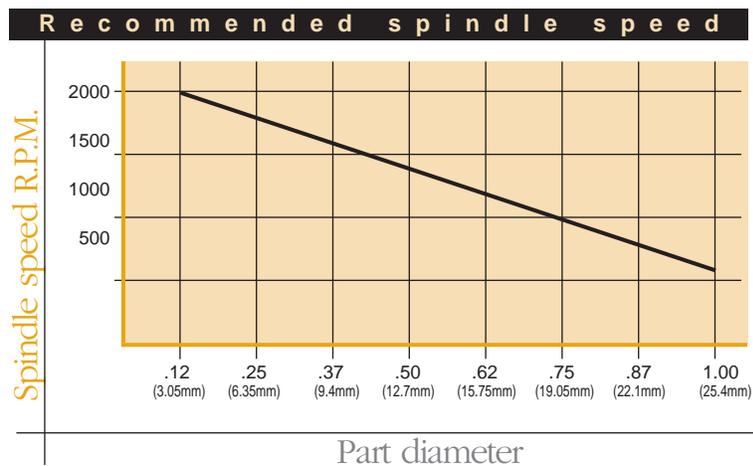
The four available CX sub-assemblies are as follows:

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

CX speed recommendations

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.

For general speed guidelines, refer to the chart below.



CX
external roller burnishing machines

CX® External roller burnishing machines

CX Interference-Style Feed Rates

The following chart depicts feed rates for selected nominal race assembly sizes. Contact our engineering department for cycle time calculations for your specific application.

Tool Size		FEED (Part Rotating)		FEED (Part Stationary)	
NOMINAL SIZE (in.)	MM	IPR	MM/REV	IPR	MM/REV
CX 062	1.57	0.063	1.60	0.009	0.23
CX 187	4.75	0.084	2.13	0.023	0.58
CX 250	6.35	0.094	2.39	0.029	0.74
CX 312	7.92	0.105	2.67	0.035	0.89
CX 375	9.52	0.115	2.92	0.040	1.01
CX 391	9.93	0.138	3.50	0.044	1.12
CX 438	11.12	0.145	3.68	0.048	1.22
CX 500	12.70	0.156	3.68	0.054	1.37
CX 562	14.27	0.166	4.21	0.060	1.52
CX 625	15.88	0.176	4.47	0.065	1.65
CX 750	19.05	0.197	5.00	0.076	1.93
CX 766	19.46	0.214	5.43	0.080	2.03
CX 875	22.22	0.232	5.89	0.089	2.26
CX 1000	25.40	0.253	6.42	0.100	2.54
CX 1031	26.19	0.129	3.27	0.051	1.29
CX 1125	28.57	0.137	3.48	0.055	1.40
CX 1250	31.75	0.147	3.73	0.061	1.55
CX 1281	32.54	0.173	4.39	0.066	1.67
CX 1375	34.92	0.181	4.60	0.070	1.78
CX 1500	38.10	0.191	4.85	0.075	1.90
CX 1625	41.27	0.201	5.10	0.080	2.03
CX 1750	44.45	0.211	5.36	0.086	2.18
CX 1875	47.62	0.222	5.64	0.091	2.31
CX 2000	50.80	0.232	5.89	0.096	2.44
CX 2125	53.97	0.242	6.14	0.102	2.59
CX 2250	57.15	0.252	6.40	0.107	2.72
CX 2375	60.32	0.263	6.68	0.112	2.84
CX 2500	63.50	0.273	6.93	0.117	2.97

CX® External roller burnishing machines

CX Air Compensating-Style Feed Rates

The following chart depicts feed rates for selected nominal race assembly sizes. Contact our engineering department for cycle time calculations for your specific application.

Tool Size		FEED (Part Rotating)		FEED (Part Stationary)	
NOMINAL SIZE (in.)	MM	IPR	MM/REV	IPR	MM/REV
CX 062	1.57	0.061	1.60	0.011	0.28
CX 187	4.75	0.081	2.06	0.024	0.61
CX 250	6.35	0.092	2.33	0.030	0.76
CX 312	7.92	0.102	2.59	0.035	0.89
CX 375	9.52	0.112	2.84	0.041	1.04
CX 391	9.93	0.132	3.35	0.045	1.14
CX 438	11.12	0.140	3.55	0.049	1.24
CX 500	12.70	0.150	3.81	0.054	1.37
CX 562	14.27	0.160	4.06	0.060	1.52
CX 625	15.88	0.171	4.34	0.065	1.65
CX 750	19.05	0.191	4.85	0.076	1.93
CX 766	19.46	0.207	5.26	0.079	2.00
CX 875	22.22	0.225	5.71	0.089	2.26
CX 1000	25.40	0.246	6.25	0.099	2.51
CX 1031	26.19	0.127	3.22	0.052	1.32
CX 1125	28.57	0.135	3.43	0.056	1.42
CX 1250	31.75	0.145	3.68	0.061	1.55
CX 1281	32.54	0.169	4.29	0.066	1.67
CX 1375	34.92	0.177	4.49	0.070	1.78
CX 1500	38.10	0.187	4.75	0.075	1.90
CX 1625	41.27	0.197	5.50	0.081	2.06
CX 1750	44.45	0.208	5.28	0.086	2.18
CX 1875	47.62	0.218	5.54	0.091	2.31
CX 2000	50.80	0.228	5.79	0.097	2.46
CX 2125	53.97	0.238	6.04	0.102	2.59
CX 2250	57.15	0.249	6.32	0.107	2.72
CX 2375	60.32	0.259	6.58	0.112	2.84
CX 2500	63.50	0.269	6.83	0.118	2.99