Operating Instructions

Bearingizing Tools

Machines

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

Material

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

Procedure

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

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

The other major factor in dimensional change is the ability of

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

Tool diameter changes

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

Speed and feed recommendations

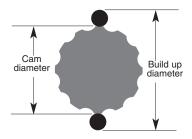
HOLE DIAMETER		RPM	HOLE DIAMETER		RPM	HOLE DIAMETER		RPM	HOLE DIAMETER		RPM
INCHES	MM	RPIVI	INCHES	MM	RPIVI	INCHES	MM	KPIVI	INCHES	ММ	RPIVI
.188	4.762	8200	.750	19.050	2000	1.750	44.45	875	2.750	69.85	555
.250	6.350	6100	.875	22.225	1800	1.875	47.62	815	2.875	73.02	530
.312	7.937	4900	1.000	25.40	1500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

Bearingizing tools

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

EXAMPLE

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

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

Roll Sizes

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

EXAMPLE

for part

Build-up required

.5020 inch (12.75mm)

Subtract cam diameter of .500 inch (12.75mm) tool

Single roll size

-.3450 inch (8.76mm) .1570 inch (3.99mm)

.0785 inch (1.99mm)

Divided by 2 .1570 inch \div 2 = .0785 inch (1.99mm)

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

Spring-Back Allowances	.188 to .5 (4.76 to 1		.500 & up (12.7 mm & up)		
	IN.	mm	IN.	mm	
Stainless	.0008	.0203	.001	.0254	
Steel	.0008	.0203	.001	.0254	
Cast Iron	.0005	.0127	.0008	.0203	
Sintered Iron	.0005	.0127	.0008	.0203	
Aluminum	.0002	.0050	.0004	.0102	
Brass	.0005	.0127	.0008	.0203	
Sintered Bronze	.0001	.0025	.0002	.0051	
Oilite	.0001	.0025	.0002	.0051	

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

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

3 Extra sets of rolls in increments of .0001 inch (.002mm) 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 1.250 inch (31.75mm) in diameter

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

Re-ordering tools and parts

Re-order 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 .0001 inch (.0025mm). Cogsdill will also re-grind cams and supply rolls to maintain original build-up.



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