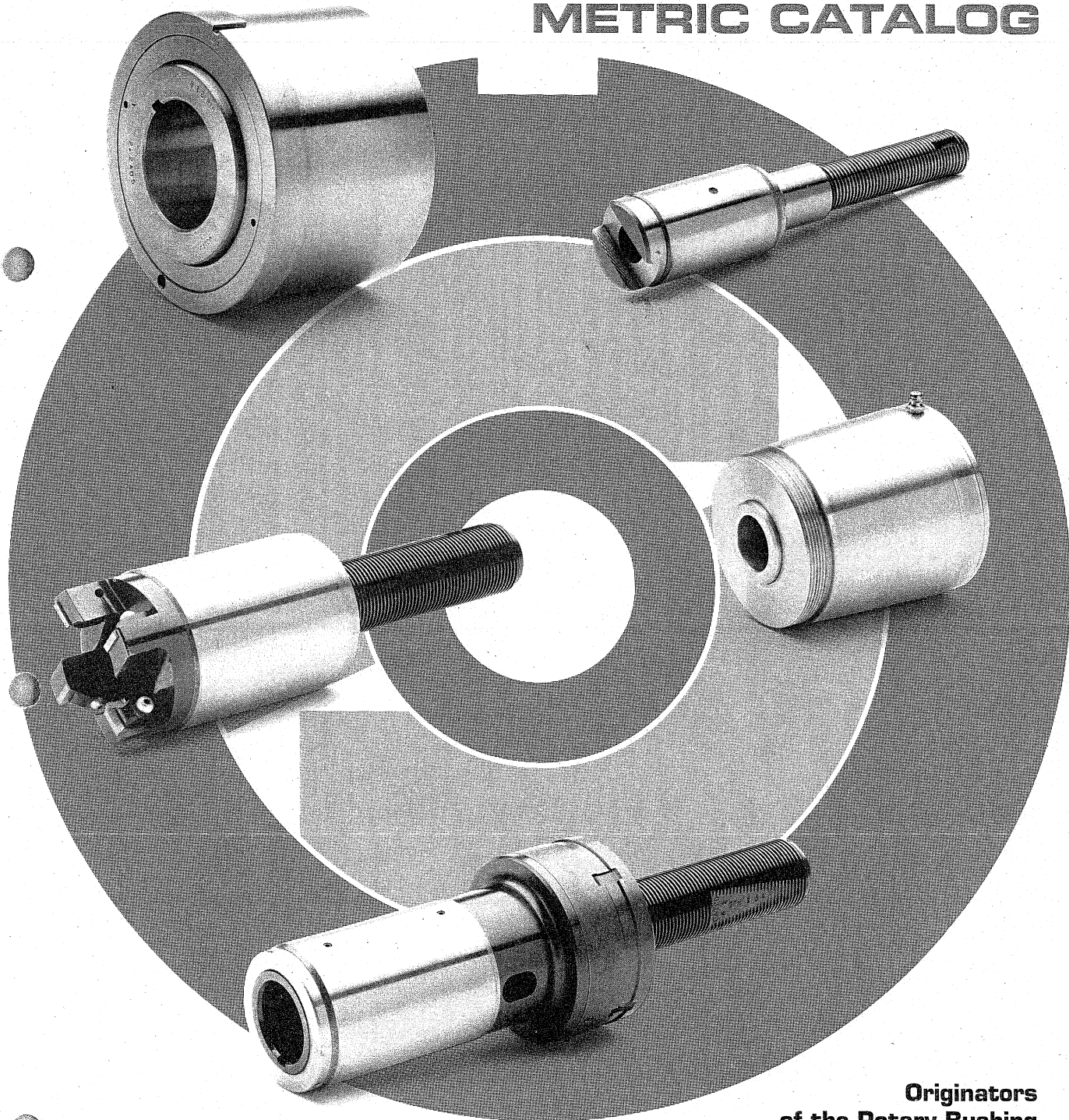


GATCO ANTIFRICTION ROTARY BUSHINGS AND TOOLHOLDERS

METRIC CATALOG



**Originators
of the Rotary Bushing**

SINCE 1913

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Also visit our web site @ www.gatcobushing.com or e-mail us @ info@gatcobushing.com

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Gatco Anti-Friction Rotary Bushings are self contained bearing cartridges used to support and guide rotating cutting tools. They consist of a stationary outer case; a hardened and ground inner liner which rotates with the cutting tool; anti-friction bearings and seals. They are manufactured in several series with each having distinct advantages that cover the broadest range of metal working applications. While available in a wide range of standard sizes, **Gatco Rotary Bushings** are commonly and readily modified to suit individual requirements or specifications. For those situations where a standard or modified standard bushing is not suitable, **Gatco's** Engineering Department can provide a special design to suit your specific requirements.

Gatco Rotary Bushings provide precision cuts as well as eliminating chatter, heat and wear often encountered using standard drill bushings. While many other uses continue to be found, **Gatco Rotary Bushings** are used primarily to guide and support rotating cutting tools in applications such as:

Precision Line Boring	Spot Facing
Reaming	Core Drilling
Hollow Milling	Gun Drilling
Recessing Tools	Milling Arbor Supports
Inspection Fixtures	Drilling
Special Machine Tools	

Rebuilding Program

Gatco Rotary Bushings will eventually reach their fatigue life. Therefore, **Gatco** offers a rebuilding program which will restore the rotary bushing to its original I.D. size, runout specifications and life expectancy. Rebuilding can be done an indefinite number of times as long as the case is re-usable as received, and involves replacement of the inner liner, bearings and seals.

Upon inspection, if a rotary bushing cannot be rebuilt, it will be returned at a nominal charge for inspection.

Maintenance/Lubrication

Gatco Rotary Bushings require very little maintenance. Only in severe applications or contaminated environments will they require re-greasing. Frequency of re-lubrication must be determined by the end user based on the environment, loads applied and running speed. When re-greasing, it is recommended that the bushing be filled with grease until contaminated grease purges past the seal on both ends. At start up, grease will continue to purge past the seals and will stop when the bearings have purged themselves.

- Recommended grease lubricant is Alvania #2 by Shell Oil (or equivalent).
- Recommended oil lubricant is Mobil DTE (or equivalent).

How To Order

- **Order by Gatco design number.**
- **Specify I.D.:** Standard I.D. and tolerance will be assigned unless otherwise specified.
- **Specify O.D.:** O.D. will be provided with approximately .5 grind stock over nominal unless O.D. grind is requested. O.D. will be ground to standard tolerances unless otherwise specified.
- **Special Tolerances:** Tolerances other than shown in this catalog are available. Specify your tolerance requirements.
- **Special Features:** Specify any features required such as flats, etch, keyways, etc.
- **Prints:** Always provide prints or sketches when available.
- **Terms:** Net 30 days.
- **Prices:** Quoted upon request.
- **Delivery:** Standard lead time is approximately 8 weeks. Consult the factory for current lead times.
- **Tool Numbers:** Provide end users tool number if available.

Bushings ordered by bushing number only will be furnished with the nominal I.D. and the O.D. with grind stock. Standard manufacturing tolerances will be assigned. No special modifications will be added unless specified.

Standard GATCO Manufacturing Tolerances

Inside Diameter:

Under 41.27	= +0.007 +0.015
41.27 and above	= +0.013 +0.025
Runout	= 0.013 T.I.R. (Closer runout avail. on request)
Finish	= 12-20 mu. in.

Outside Diameter:

Standard rotary bushings are furnished .5 oversize for O.D. grinding to fit at assembly by the customer.

Finish ground diameter available on request (extra cost).

Standard tolerance spread: 0.013

Recommended Fitting Tolerance

Minimum Clearance Between Shaft and Bushing:

- Under 41.27 — 0.007
- 41.27 and above — 0.013

Minimum Clearance Between Housing and Bushing:

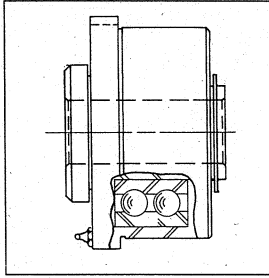
- Line on Line to 0.013 clearance

INCH SERIES CATALOG AVAILABLE ON REQUEST

CATALOGED BUSHINGS AND SPECIAL DESIGNS

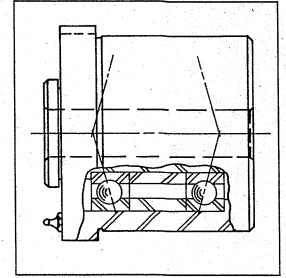
M SERIES

Recommended for use only when one end of the guided bar is rigidly supported in a spindle. M Series bushings are rigid, friction free rotary guide or support bushings which incorporate a heavy duty, double row ball bearing. M Series bushings are recommended when precision finish part tolerances are *not* required, in applications such as drilling.



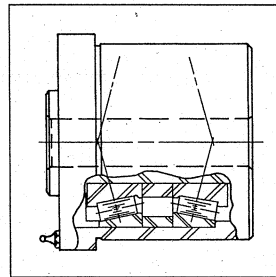
GM SERIES

For use with a bar rigidly mounted in a spindle or with a floating bar. GM series bushings feature a spaced pair of single row ball bearings for maximum stability needed with longer bar travel. GM series bushings are recommended where finished part tolerance is critical in operations such as precision line boring. These bushings can be provided with tighter size and runout tolerances than standard.



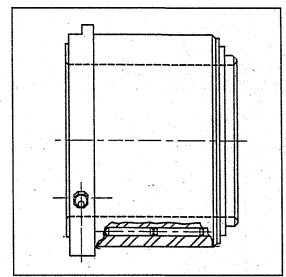
GTRM and GTRSM SERIES

These rotary bushings are recommended for use with a bar rigidly mounted in a spindle or with a floating bar. GTRM and GTRSM bushings incorporate a pair of tapered roller bearings which are capable of taking high radial, thrust and shock loads. They are commonly used in operations where interrupted cuts and heavy loads are encountered such as gang milling.



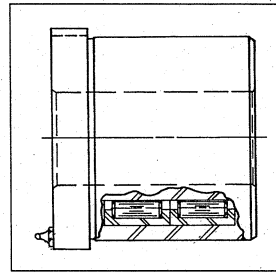
GNTM SERIES

Are used when the bar is mounted rigidly in a spindle. GNTM bushings are commonly used in operations where space is limited. Their unique construction allows a larger I.D. for a given O.D.. Because they incorporate needle bearings, they are capable of withstanding high radial loads but only nominal thrust loads. They are commonly used in multiple spindle operations where centerline distances between spindles is limited.



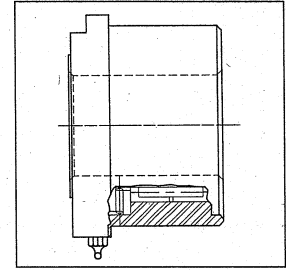
GNM and NM SERIES

Are recommended for use when one end of the bar is mounted rigidly in a spindle. GNM bushings are commonly used in applications where space is limited. Their needle bearing construction allows for closer centerline distances between spindles. NM series bushings are identical in construction to the GNM series except peripheral dimension.



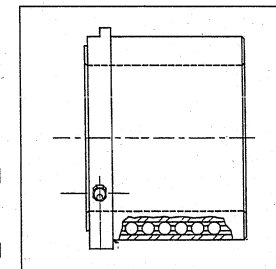
RECESSING BUSHINGS

These bushings were developed to be used in conjunction with recessing holders. They provide high thrust capabilities required to activate recessing tools. Their unique design incorporates needle bearings for maximum radial load capacity as well as a thrust bearing for thrust loading. Recessing bushings can be used in any operation where high thrust and radial loads are encountered.



GBM SERIES

These bushings are for use with bars mounted rigidly in a spindle. GBM bushings incorporate ball and retainer bearing construction. Because the balls are pre-loaded, running clearances are removed and more precise bushing runout is realized. GBM series bushings are commonly used for precision line boring when the close centerline distance of the part will not accept the GM series.



SPECIAL DESIGNS

Gatco offers a special design service for rotary bushings. Your special design requirements will be taken from design concept through final manufacture. Our Engineering Department can make recommendations which will make your machine run at maximum optimization. Because of our CAD capability, if we are furnished with size and performance requirements, a special design can usually be prepared for customer's approval within hours. When requesting a special design, please provide prints and all pertinent information regarding the operation. Availability for specials and standards is the same; pricing covers the additional features ordered. Refer to page 16 for DESIGN FAX information.

IMPORTANT NOTE: The recommendations in this catalog are those generally applicable, but they are not to be interpreted as applying, without reservation or exception, to each and every application. The model and type of each rotary bushing or toolholder selected for a given application, and other conditions surrounding that application, may modify these average limitations one way or the other. Therefore, it is recommended, in most cases, to provide full information to us and let our experienced engineering department submit their recommendation.

RECOMMENDED USAGE

BUSHING SERIES	PRECISION LINE BORING	MILLING	DRILLING	REAMING	SPOT-FACING	RECESSING	GUN DRILLING	BORING	FLOATING HOLDERS	INSPECTION FIXTURES
	M SERIES		X	X		X			X	
GM SERIES	X	X	X	X	X		X	X	X	X
GTRM & GTRSM SERIES		X	X	X	X		X	X	X	X
GNTM SERIES		X	X	X	X			X		
GBM SERIES	X		X	X				X		X
GNM & NMS SERIES		X	X	X	X		X	X		
RECESSING BUSHINGS						X				

CONSTRUCTION

BUSHING SERIES	OUTER CASE	INNER ROTATING LINER	BEARINGS	SEALS
M SERIES	MACHINE STEEL	MACHINE STEEL HDN. RC 60-62	DOUBLE ROW ANGULAR CONTACT BEARING	FELT SEALS (LIP SEALS AVAILABLE ON REQUEST)
GM SERIES	MACHINE STEEL	MACHINE STEEL HDN. RC 60-62	(1) PAIR SINGLE ROW DEEP GROOVE BEARING	FELT SEALS—SEALED BEARING (LIP SEALS AVAILABLE ON REQUEST)
GTRM & GTRSM SERIES	MACHINE STEEL	MACHINE STEEL HDN. RC 60-62	(1) PAIR TAPERED ROLLER BEARINGS	LIP SEALS
GNTM SERIES	BEARING STEEL HDN. RC 60-62	BEARING STEEL HDN. RC 60-62	(1) PAIR CAGED NEEDLE BEARINGS	O-RING AND REAR FLINGER
GBM SERIES	BEARING STEEL HDN. RC 60-62	BEARING STEEL HDN. RC 60-62	BALL & RETAINER BEARING	LIP SEALS
GNM & NMS SERIES	MACHINE STEEL	BEARING STEEL HDN. RC 60-62	NEEDLE ROLLER BEARINGS	LIP SEALS
RECESSING BUSHINGS	MACHINE STEEL	BEARING STEEL HDN. RC 60-62	NEEDLE ROLLER BEARING (RADIAL) AND NEEDLE THRUST BEARING (AXIAL)	O-RING AND REAR LIP SEAL

CUSTOM FEATURES AVAILABLE ON REQUEST

- STRAIGHT FLATS
- RADIUS FLATS
- SPECIAL I.D.
- SPECIAL O.D.
- HARDENED O.D.
- KEY

- SPECIAL TOLERANCE
- O.D. GRINDING
- ETCH
- COUNTER-CLOCKWISE ROTATION
- KEYWAY

- TAPPED HOLES
- DRILL & C-SINK HOLES
- SLOTS
- LEADS
- FACE GRINDS
- TIMING LEADS

FOR ANY QUESTION /APPLICATION ASSISTANCE OR SPECIAL DESIGNS—CONTACT GATCO'S ENGINEERING DEPARTMENT AT (313) 453-2295

M SERIES

for use with bar supported at one end with spindle

Sizes M7 to M18 incl. R.H. Rotation (std.) Shown L.H. Rotation Optional.

May be ordered with I.D. and/or tolerances other than standard.

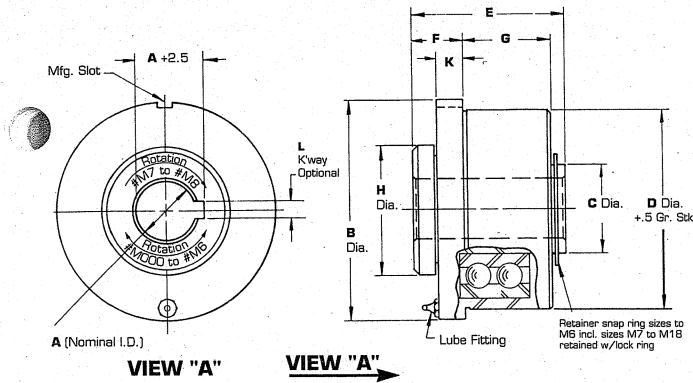
Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

NOTE: M000, M00, M0 and M1: No Lube Fitting. Lubed for Life.

Two place dimensions in tabulation $\pm .76$

See GTRSM Series for comparative sizes.

See page 7 for Speed and Load Chart.



M NO.	STD A NOM	MAX W/O KEYWAY	MAX WITH KEYWAY	A TOL	B	C	D NOMINAL	E	F	G	H	K	L
000	6.000	6.909	-	+0.007 +0.015	44.5	11.9	38.000	35.1	10.4	20.6	22.4	4.8	-
00	12.000	12.954	-		50.8	17.0	44.000	40.4	13.5	22.4	30.2	7.9	-
0	14.000	14.910	-		57.2	20.1	52.000	43.7	13.5	25.4	33.3	7.9	-
1	19.000	19.914	-		63.5	24.9	59.000	45.2	15.0	25.4	38.1	7.9	-
2	23.000	24.917	-		76.2	30.0	70.000	48.5	15.0	28.4	44.5	7.9	-
3	28.000	29.921	-		87.4	35.1	81.000	51.6	16.8	30.2	50.8	9.7	-
4	33.000	34.925	28.575		95.9	39.9	89.000	54.9	16.8	33.3	57.2	9.7	6.4
5	38.000	39.675	31.750		100.1	45.0	92.000	54.9	16.8	36.5	60.5	9.7	6.4
6	42.000	44.450	39.688		106.4	50.0	98.000	58.7	17.5	39.6	66.5	9.7	6.4
7	46.000	49.200	41.275		114.3	73.2	106.000	63.5	17.5	39.6	74.7	9.7	6.4
8	50.000	53.975	47.625	125.5	76.2	117.000	66.5	17.5	42.9	76.2	9.7	6.4	
9	55.000	58.725	50.800	133.4	82.6	127.000	68.3	17.5	44.5	82.6	9.7	6.4	
10	60.000	63.500	57.150	139.7	88.9	132.000	69.9	17.5	46.0	88.9	9.7	6.4	
11	65.000	68.275	60.325	146.1	95.3	138.000	71.4	17.5	47.8	95.3	9.7	6.4	
12	69.000	73.025	66.675	155.4	101.6	148.000	74.7	17.5	50.8	101.6	9.7	6.4	
13	73.000	76.200	69.850	165.1	108.0	159.000	87.4	22.4	58.7	108.0	11.2	9.7	
14	76.000	79.375	76.200	177.8	114.3	168.000	90.4	22.4	62.0	111.3	11.2	9.7	
15	82.000	84.836	82.550	187.5	120.7	178.000	93.7	22.4	65.0	120.7	11.2	9.7	
16	87.000	89.662	87.313	196.9	127.0	189.000	98.6	22.4	69.9	127.0	11.2	9.7	
17	92.000	94.742	92.075	209.6	133.4	200.000	103.1	22.4	74.7	133.4	11.2	9.7	
18	98.000	99.822	98.425	215.9	139.7	210.000	108.0	22.4	79.2	139.7	11.2	9.7	

GM SERIES

for use with floating or supported bar and/or longer bar travel

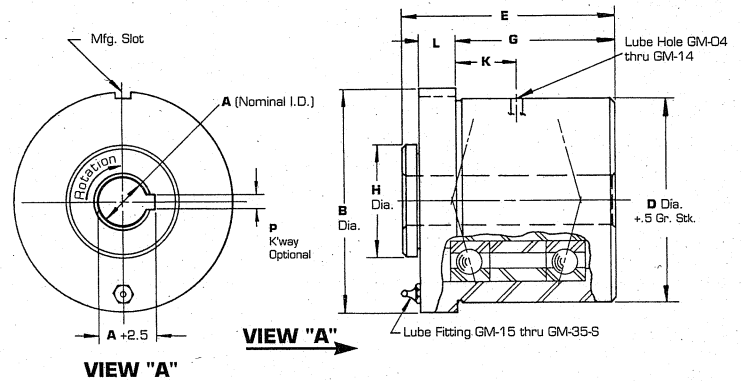
R.H. Rotation (std.) Shown, L.H. Rotation Optional.

May be ordered with I.D. and/or tolerances other than standard.

Two place dimensions in tabulation $\pm .76$

See GTRM Series for comparative sizes.

See page 7 for Speed and Load Chart.



GM NO.	STD A NOM	MAX. W/O KEYWAY	MAX. WITH KEYWAY	A TOL	B	D NOMINAL	E	G	H	K	L	P
04	12.000	14.986	-	+0.007 +0.015	53.8	48.000	55.6	41.1	31.8	15.7	9.7	-
05	14.000	14.986	-		57.2	51.000	55.6	41.1	31.8	15.7	9.7	-
06	15.000	19.812	-		66.5	59.000	60.5	46.0	38.1	17.5	9.7	-
07	19.000	24.638	-		69.9	64.000	60.5	46.0	41.1	18.3	9.7	-
08	23.000	29.464	-		76.2	70.000	62.0	47.8	47.8	19.1	9.7	-
09	25.000	29.464	-		76.2	70.000	62.0	47.8	47.8	19.1	9.7	-
10	28.000	33.528	-		88.9	81.000	84.8	65.0	53.8	25.4	13.5	-
11	31.000	33.528	-		88.9	81.000	84.8	65.0	53.8	25.4	13.5	-
12	33.000	38.100	34.036		91.9	86.000	82.6	62.0	57.2	23.9	14.2	6.4
13	38.000	41.148	38.862		98.6	92.000	82.6	62.0	63.5	23.9	14.2	6.4
14	42.000	46.736	43.688	104.6	98.000	84.1	63.5	66.5	25.4	14.2	6.4	
15	44.000	46.736	43.688	111.3	105.000	85.9	63.5	66.5	-	15.7	6.4	
16	47.000	50.800	48.514	120.7	114.000	95.3	73.2	76.2	-	15.7	6.4	
17	50.000	54.864	52.324	124.0	117.000	95.3	74.7	82.6	-	14.2	6.4	
18	53.000	60.452	57.404	133.4	127.000	95.3	73.2	85.9	-	14.2	6.4	
19	57.000	60.452	57.404	136.7	130.000	95.3	73.2	85.9	-	14.2	6.4	
20	60.000	65.024	61.976	139.7	133.000	103.1	77.7	91.9	-	17.5	6.4	
21	69.000	72.136	67.310	146.1	137.000	104.6	77.7	95.3	-	19.1	6.4	
22	76.000	81.026	76.962	171.5	162.000	120.7	95.3	108.0	-	17.5	9.7	
23	88.000	97.536	94.488	196.9	184.000	127.0	101.6	127.0	-	17.5	9.7	
24	95.000	97.536	94.488	196.9	184.000	127.0	101.6	127.0	-	17.5	9.7	
25-S	101.000	115.062	112.014	+0.013 +0.025	209.6	197.000	139.7	108.0	146.1	-	22.4	9.7
26-S	107.000	115.062	112.014		209.6	197.000	139.7	108.0	146.1	-	22.4	9.7
27-S	114.000	115.062	112.014		209.6	197.000	139.7	108.0	146.1	-	22.4	9.7
28-S	120.000	127.762	123.952		222.3	210.000	147.6	114.3	165.1	-	22.4	9.7
29-S	127.000	127.762	123.952		222.3	210.000	147.6	114.3	165.1	-	22.4	9.7
30-S	133.000	149.352	147.574		254.0	241.000	163.6	127.0	190.5	-	25.4	9.7
31-S	139.000	149.352	147.574		254.0	241.000	163.6	127.0	190.5	-	25.4	9.7
32-S	146.000	149.352	147.574		254.0	241.000	163.6	127.0	190.5	-	25.4	9.7
33-S	152.000	166.624	165.862		276.4	267.000	163.6	127.0	203.2	-	25.4	9.7
34-S	158.000	166.624	165.862		276.4	267.000	163.6	127.0	203.2	-	25.4	9.7
35-S	165.000	166.624	165.862	276.4	267.000	163.6	127.0	203.2	-	25.4	9.7	

GNM SERIES

for use with bar supported at one end with spindle

R.H. Rotation (std.) Shown. L.H. Rotation Optional.

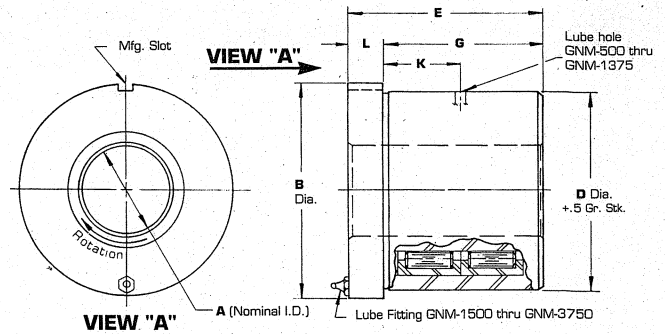
May be ordered with I.D. and/or tolerances other than standard.

Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

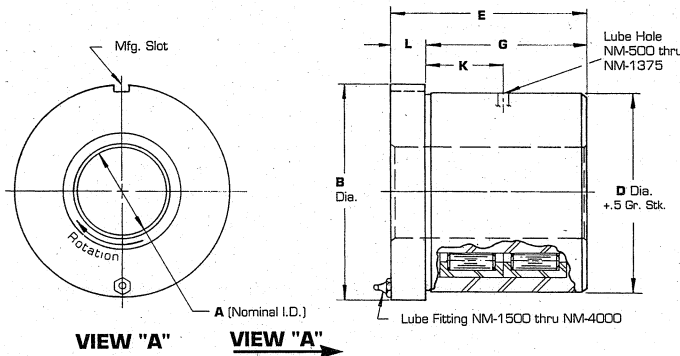
Two place dimensions in tabulation $\pm .76$

See M Series for comparative sizes.

See page 7 for Speed and Load Chart.



GNM NO.	STD. A NOMINAL	MAXIMUM	A TOL	B	D NOMINAL	E	G	K	L
500	12.000	14.275	+0.007 +0.015	41.1	35.000	44.5	35.1	17.5	9.4
625	15.000	17.272		47.8	41.000	44.5	35.1	17.5	9.4
750	19.000	20.320		50.8	44.000	44.5	35.1	18.3	9.4
875	22.000	26.289		57.2	51.000	44.5	35.1	18.3	9.4
1000	25.000	29.362		62.0	56.000	50.8	41.1	21.3	9.7
1125	28.000	32.537		65.0	59.000	50.8	41.1	20.6	9.7
1250	31.000	35.712		68.3	62.000	50.8	41.1	20.6	9.7
1375	34.000	38.887		76.2	70.000	50.8	41.1	20.6	9.7
1500	38.000	44.450		88.9	76.000	79.2	63.5	-	15.7
1625	41.000	47.752		95.3	83.000	104.6	88.9	-	15.7
1750	44.000	49.276	95.3	83.000	104.6	88.9	-	15.7	
1875	47.000	55.626	101.6	89.000	104.6	88.9	-	15.7	
2000	50.000	56.896	101.6	89.000	104.6	88.9	-	15.7	
2250	57.000	62.992	114.3	102.000	106.2	90.4	-	15.7	
2500	63.000	69.342	120.7	108.000	111.0	91.9	-	19.1	
2750	69.000	74.676	+0.013 +0.025	133.4	121.000	112.8	93.7	-	19.1
3000	76.000	78.486	139.7	127.000	120.7	101.6	-	19.1	
3250	82.000	84.328	146.1	133.000	133.4	114.3	-	19.1	
3500	88.000	90.678	152.4	140.000	133.4	114.3	-	19.1	
3750	95.000	97.028	158.8	146.000	136.7	114.3	-	22.4	



NM SERIES

for use with bar supported at one end with spindle

R.H. Rotation (std.) Shown. L.H. Rotation Optional.

May be ordered with I.D. and/or tolerances other than standard.

Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

Two place dimensions in tabulation $\pm .76$

See GNM Series for comparative sizes.

See page 7 for Speed and Load Chart.

NM NO.	STD. A NOMINAL	MAXIMUM	A TOL	B	D NOMINAL	E	G	K	L
500	12.000	14.275	+0.007 +0.015	39.6	35.000	47.8	38.1	19.1	9.7
625	15.000	17.272		47.8	44.000	44.5	33.3	15.7	11.2
750	19.000	20.320		50.8	48.000	44.5	33.3	16.5	11.2
875	22.000	26.289		53.8	51.000	47.8	36.6	18.3	11.2
1000	25.000	29.362		58.7	56.000	49.3	38.1	19.1	11.2
1125	28.000	32.537		62.0	59.000	52.3	41.1	19.1	11.2
1250	31.000	35.712		65.0	62.000	52.3	41.1	19.1	11.2
1375	34.000	38.887		73.2	70.000	52.3	41.1	20.6	11.2
1500	38.000	44.450		82.6	76.000	88.9	76.2	-	12.7
1625	41.000	47.752		85.6	79.000	88.9	76.2	-	12.7
1750	44.000	48.463	88.9	83.000	88.9	76.2	-	12.7	
1875	47.000	55.626	95.3	89.000	104.6	76.2	-	28.4	
2000	50.000	56.896	101.6	95.000	104.6	76.2	-	28.4	
2125	53.000	62.992	108.0	102.000	108.0	82.6	-	25.4	
2250	57.000	62.992	108.0	102.000	108.0	82.6	-	25.4	
2375	60.000	69.342	120.7	114.000	109.5	82.6	-	26.9	
2500	63.000	69.342	120.7	114.000	109.5	82.6	-	26.9	
2625	66.000	74.676	133.4	127.000	125.5	98.6	-	26.9	
2750	69.000	74.676	133.4	127.000	125.5	98.6	-	26.9	
2875	73.000	78.486	142.7	137.000	138.2	108.0	-	30.2	
3000	76.000	78.486	142.7	137.000	138.2	108.0	-	30.2	
3125	79.000	84.328	146.1	140.000	138.2	108.0	-	30.2	
3250	82.000	84.328	146.1	140.000	138.2	108.0	-	30.2	
3375	85.000	90.678	152.4	146.000	142.7	117.3	-	25.4	
3500	88.000	90.678	152.4	146.000	142.7	117.3	-	25.4	
3625	92.000	97.028	158.8	152.000	142.7	117.3	-	25.4	
3750	95.000	97.028	158.8	152.000	142.7	117.3	-	25.4	
3875	98.000	112.293	184.2	178.000	168.1	139.7	-	28.4	
4000	101.000	112.293	184.2	178.000	168.1	139.7	-	28.4	

GNTM SERIES

for use with bar supported at one end with spindle

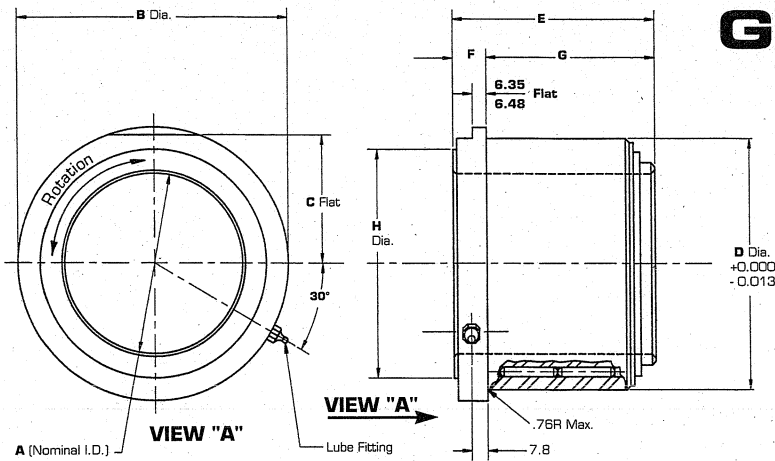
May be ordered with I.D. and/or tolerances other than standard.

Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

Two place dimensions in tabulation $\pm .76$

See GBM Series for comparative sizes.

See page 7 for Speed and Load Chart.



GNTM NO.	A NOMINAL	TOL	B	C	D NOMINAL	E	F	G	H
100	25.000	+0.007 +0.015	62.0	26.9	51.000	52.3	15.75	36.6	42.2
125	31.000		68.3	30.2	57.000	52.3	15.75	36.6	49.3
150	38.000		74.7	33.3	64.000	58.7	15.75	42.9	52.3
175	44.000		81.0	36.6	73.000	65.0	15.75	49.3	63.5
200	50.000		87.4	39.6	79.000	71.4	15.75	55.6	69.9
225	57.000		103.1	47.8	92.000	82.6	17.53	65.0	80.0
250	63.000		109.5	50.8	98.000	88.9	17.53	71.4	88.9
275	69.000		115.8	53.8	105.000	95.3	17.53	77.7	95.3
300	76.000		122.2	57.2	114.000	95.3	17.53	77.7	101.6
325	82.000		+0.013 +0.025	128.5	60.5	117.000	95.3	17.53	77.7
350	88.000	134.9		63.5	124.000	101.6	17.53	84.1	112.8
375	95.000	138.2		65.0	133.000	101.6	17.53	84.1	122.7
400	101.000	144.5		68.3	137.000	101.6	17.53	84.1	127.8

GBM SERIES

for use with bar supported at one end with spindle

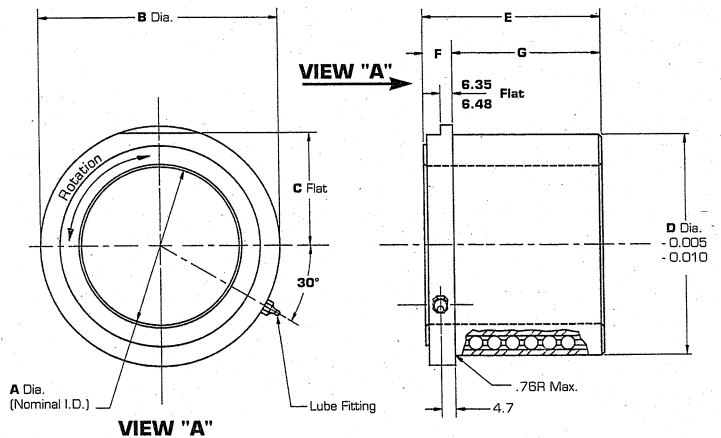
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Two place dimensions in tabulation: $\pm .76$

See GNTM Series for comparative sizes.

See page 7 for Speed and Load Chart.



GBM NO.	A NOMINAL	TOL	B	C	D NOMINAL	E	F	G
100	25.000	+0.007 +0.015	62.0	26.9	51.000	52.3	15.75	36.6
125	31.000		68.3	30.2	57.000	52.3	15.75	36.6
150	38.000		74.7	33.3	64.000	58.7	15.75	42.9
175	44.000		81.0	36.6	73.000	65.0	15.75	49.3
200	50.000		87.4	39.6	79.000	71.4	15.75	55.6
225	57.000		103.1	47.8	92.000	82.6	17.53	65.0
250	63.000		109.5	50.8	98.000	88.9	17.53	71.4
275	69.000		115.8	53.8	105.000	95.3	17.53	77.7
300	76.000		122.2	57.2	114.000	95.3	17.53	77.7
325	82.000		+0.013 +0.025	128.5	60.5	117.000	95.3	17.53
350	88.000	134.9		63.5	124.000	101.6	17.53	84.1
375	95.000	138.2		65.0	133.000	101.6	17.53	84.1
400	101.000	144.5		68.3	137.000	101.6	17.53	84.1

GTRM SERIES

for use with floating or supported bar and/or longer bar travel

R.H. Rotation (std.) Shown. L.H. Rotation Optional

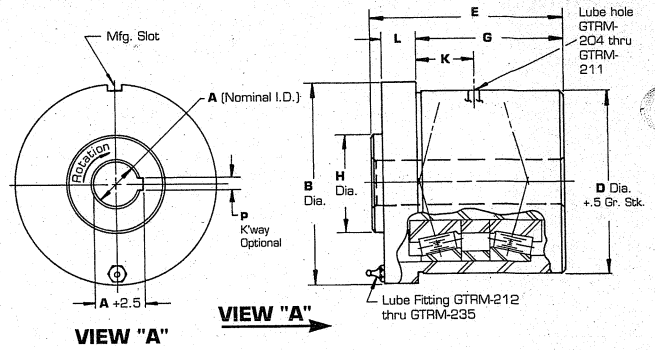
May be ordered with I.D. and/or tolerances other than standard.

Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

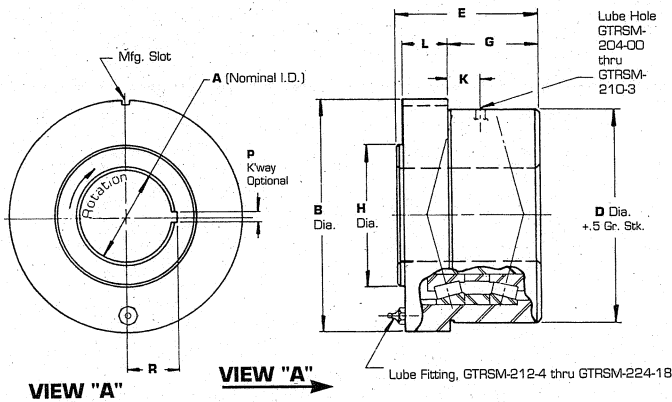
Two place dimensions in tabulation $\pm .76$

See GM Series for comparative sizes.

See page 7 for Speed and Load Chart.



GTRM NO.	STD. A NOM	MAX W/O KEYWAY	MAX WITH KEYWAY	A TOL	B	D NOM	E	G	H	K	L	P
204	12.000	14.351	-	+0.007 +0.015	52.3	48.000	54.6	41.1	28.2	15.2	10.4	-
205	14.000	14.351	-		55.6	51.000	54.6	41.1	28.2	15.2	10.4	-
206	15.000	19.812	-		63.5	59.000	59.4	46.0	34.5	17.8	10.4	-
207	19.000	19.812	-		68.3	64.000	60.2	46.0	34.5	17.5	11.2	-
208	23.000	26.162	-		74.7	70.000	62.0	47.8	43.9	18.3	11.2	-
209	25.000	26.162	-		74.7	70.000	62.0	47.8	43.9	18.3	11.2	-
210	28.000	32.512	-		85.9	81.000	84.3	65.0	50.3	25.4	15.0	-
211	31.000	32.512	-		85.9	81.000	84.3	65.0	50.3	25.4	15.0	-
212	33.000	38.100	34.036		91.9	86.000	82.0	62.0	56.4	-	15.7	6.4
213	38.000	41.148	39.624		98.6	92.000	82.0	62.0	62.7	-	15.7	6.4
214	42.000	47.752	45.212	104.6	98.000	83.6	63.5	69.1	-	15.7	6.4	
215	44.000	47.752	45.212	111.3	105.000	85.1	63.5	69.1	-	17.3	6.4	
216	47.000	50.800	47.752	120.7	114.000	94.7	73.2	75.4	-	17.3	6.4	
217	50.000	54.102	50.800	124.0	117.000	94.7	74.7	75.4	-	15.7	6.4	
218	53.000	60.452	57.150	133.4	127.000	95.3	73.2	88.1	-	17.8	6.4	
219	57.000	60.452	57.150	136.7	130.000	95.0	73.2	88.1	-	17.5	6.4	
220	60.000	69.850	65.024	139.7	133.000	99.6	77.7	88.1	-	17.5	6.4	
221	69.000	76.200	70.612	142.7	137.000	104.4	77.7	100.8	-	22.4	6.4	
222	76.000	86.614	82.550	168.1	162.000	117.1	95.3	109.7	-	17.5	9.7	
223	88.000	106.426	104.902	190.5	184.000	125.7	101.6	132.1	-	19.8	9.7	
224	95.000	106.426	104.902	190.5	184.000	125.7	101.6	132.1	-	19.8	9.7	
225	101.000	119.126	115.824	209.6	203.000	138.2	108.0	150.6	-	25.4	9.7	
226	107.000	119.126	115.824	209.6	203.000	138.2	108.0	150.6	-	25.4	9.7	
227	114.000	119.126	115.824	209.6	203.000	138.2	108.0	150.6	-	25.4	9.7	
228	120.000	146.812	141.224	266.7	254.000	153.2	120.7	182.4	-	26.2	9.7	
229	127.000	146.812	141.224	266.7	254.000	153.2	120.7	182.4	-	26.2	9.7	
230	133.000	146.812	141.224	266.7	254.000	153.2	120.7	182.4	-	26.2	9.7	
231	139.000	146.812	141.224	266.7	254.000	153.2	120.7	182.4	-	26.2	9.7	
232	146.000	146.812	141.224	266.7	254.000	153.2	120.7	182.4	-	26.2	9.7	
233	152.000	177.800	171.450	298.5	279.000	165.1	133.4	213.9	-	25.4	9.7	
234	158.000	177.800	171.450	298.5	279.000	165.1	133.4	213.9	-	25.4	9.7	
235	165.000	177.800	171.450	317.5	298.000	165.1	133.4	213.9	-	25.4	9.7	



GTRSM SERIES

for use with floating or supported bar

R.H. Rotation (std.) Shown. L.H. Rotation Optional

May be ordered with I.D. and/or tolerances other than standard.

Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see pg. 16).

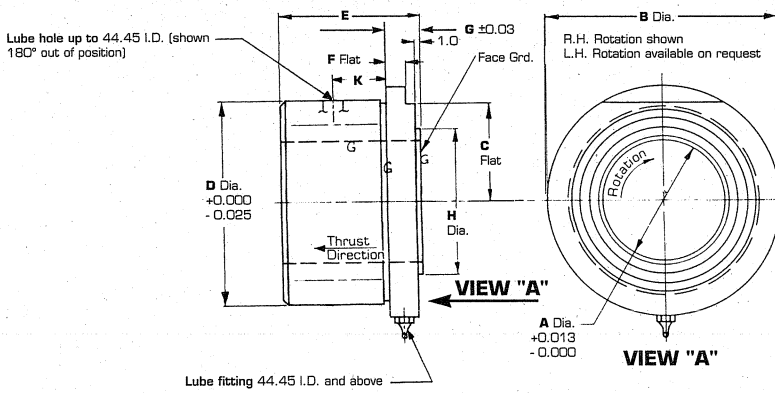
Two place dimensions in tabulation $\pm .76$

See GTRM Series for comparative sizes.

See page 7 for Speed and Load Chart.

GTRSM NO.	STD. A NOM	MAX W/O KEYWAY	A TOL	B	D NOM.	E	G	H	K	L	P	R
204-00	12.000	14.351	+0.007 +0.015	50.8	44.000	47.8	26.9	28.2	4.8	17.8	3.18	7.92
205-0	14.000	14.351		57.2	52.000	47.8	26.9	28.2	4.8	17.8	3.18	7.92
207-1	19.000	19.812		63.5	59.000	53.8	30.2	34.5	4.8	20.6	3.18	11.10
208-2	23.000	26.162		76.2	70.000	54.6	33.3	43.9	7.1	18.3	4.75	14.27
210-3	28.000	32.512		87.4	81.000	51.6	36.6	50.3	14.2	11.9	4.75	16.66
212-4	33.000	38.100		95.3	89.000	61.0	39.6	56.4	-	18.3	4.75	18.24
213-5	38.000	41.148		98.3	92.000	62.5	39.6	62.7	-	19.8	4.75	20.62
214-6	42.000	47.752		104.6	98.000	66.5	41.1	69.6	-	22.4	6.35	23.01
215-7	46.000	47.752		114.3	106.000	71.4	46.0	69.6	-	22.4	6.35	23.80
217-8	50.000	54.102		123.7	117.000	76.2	49.3	75.4	-	23.9	6.35	28.58
218-9	55.000	60.452	133.4	127.000	77.7	50.8	88.1	-	23.9	6.35	30.15	
220-10	60.000	69.850	139.7	132.000	79.2	52.3	88.1	-	23.9	6.35	31.75	
221-11	66.000	76.200	146.1	138.000	80.8	53.8	100.8	-	23.9	6.35	36.50	
221-12	69.000	76.200	152.4	148.000	80.8	57.2	100.8	-	20.6	6.35	36.50	
222-13	73.000	86.614	165.1	159.000	95.0	65.0	107.7	-	26.9	7.92	39.67	
222-14	76.000	86.614	177.8	168.000	95.0	68.3	107.7	-	23.9	7.92	39.67	
223-15	82.000	95.250	187.5	178.000	102.9	71.4	133.4	-	28.4	7.92	49.20	
223-16	87.000	95.250	196.9	189.000	103.1	76.2	133.4	-	23.9	7.92	49.20	
223-17	88.000	95.250	209.6	200.000	103.1	81.0	133.4	-	19.9	7.92	49.20	
224-18	98.000	106.426	215.9	210.000	111.3	85.9	132.1	-	20.6	9.55	49.20	

RECESSING BUSHINGS



Designed to support Recessing Toolholders for I.D. recessing, chamfering, and backfacing. Also for similar O.D. operations requiring rigid thrust support (see page 9 for typical recessing operation).

Capacities based on 1000 R.P.M. 1500 hrs. B₁₀ life.

GATCO NO.	BOKUM MODEL	A	B	C	D	E	F	G	H	K	MAX SPEED	RADIAL CAP N	THRUST CAP N
2298	"R"	31.758	68.3	31.0	61.913	31.0	4.8	9.65	44.5	10.2	3200	3559	3572
1849	"B&K"	31.758	68.3	27.7	61.913	50.8	4.8	9.65	44.5	20.5	3200	7442	3572
1850	"B&K" O'Size	38.108	76.2	31.8	69.850	50.8	4.8	17.53	53.8	20.5	2600	8038	3870
1851	"O"	44.463	98.6	41.4	88.900	66.5	9.7	17.53	63.5	—	2300	10418	3870
1852	"M&L"	63.513	120.7	52.3	107.950	71.4	9.7	17.53	82.6	—	1763	21351	4168

Gatco, Inc. can provide Rotary Recessing Bushings for use with Recessing Toolholders of other manufacturers. Call for information on bushings used with Scully Jones, Cogsdill, Nobur and Maxwell recessing holders.

SPEED AND LOAD CAPACITIES

Load capacities in N. based on 1000 R.P.M. 1500 hrs. B₁₀ life* Max. speed based on grease lubrication; can be increased by using oil lubrication

GM	Max. Speed (RPM)	Load Capacity in Newtons	
		Radial	Thrust
04, 05	5850	3692	1690
06	4800	3959	1779
07	3930	5961	2669
08, 09	3450	6316	2891
10, 11	3160	8229	3670
12	2780	9297	4003
13	2490	9742	4226
14, 15	2200	11210	4893
16	2110	12811	5560
17	1910	13345	5783
18, 19	1820	16280	7117
20	3200	16992	7117
21	3040	20061	8452
22	2720	24243	10231
23, 24	2160	33629	13789
25-S, 26-S, 27-S	2030	30515	11565
28-S, 29-S	1900	31449	12010
30-S, 31-S, 32-S	1580	39144	14234
33-S, 34-S, 35-S	1470	47151	17348

GTRM & GTRSM	Max. Speed (RPM)	Load Capacity in Newtons	
		Radial	Thrust
204, 205	3440	3781	1690
206, 207	2810	8274	2713
208, 209	2200	11210	3914
210, 211	1920	15880	5471
212	1710	14234	6183
213	1540	19038	5783
214, 215	1400	19995	6628
216	1280	32383	11743
217	1280	27579	9119
218, 219	1100	29536	10498
220	1100	36653	15836
221	1000	36653	13122
222	2630	50532	21351
223, 224	2190	49820	14190
225, 226, 227	1910	97505	26689
228 thru 232	1580	107469	35408
233, 234, 235	1300	111028	42258

M	Max. Speed (RPM)	Load Capacity in Newtons	
		Radial	Thrust
000	11200	2091	1690
00	8800	2598	2091
0	7200	3870	3114
1	5760	4181	3381
2	4880	5872	4715
3	4320	6050	4849
4	3760	8007	6450
5	3440	10453	8407
6	3200	10854	8719
7	2880	13834	11121
8	2560	17081	13789
9	2480	17659	14234
10	2320	20640	16636
11	2160	21351	17215
12	2000	25399	20462
13	1840	29848	24065
14	1760	34429	27757
15	1680	37810	30470
16	1600	42881	34563
17	1520	48219	38877
18	1440	52489	42347

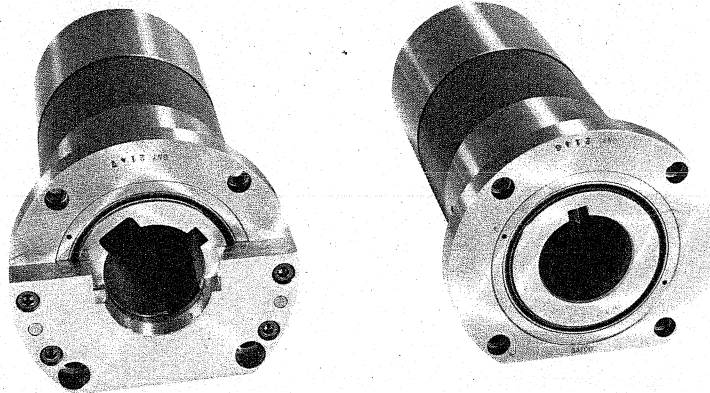
GNTM & GBM	Max. Speed (RPM)	Load Capacity in Newtons	
		Radial	Thrust
100	2936	6806	378
125	2437	7500	409
150	2362	7162	418
175	1925	14959	601
200	1749	18331	814
225	1528	20440	863
250	1356	17673	1299
275	1265	18202	1370
300	1180	18843	1406
325	1112	26124	1463
350	1078	24020	1490
375	992	26129	1552
400	939	26547	1606

Note: for GBM radial capacities, use 50% of the values shown above

GNM & NM	Max. Speed (RPM)	Load Capacity in Newtons	
		Radial	Thrust
500	5200	5026	
625	4440	5160	
750	3870	5872	
875	3090	6583	
1000	2790	8229	
1125	2680	8985	
1250	2370	8985	
1375	2210	9742	
1500	1910	16725	
1625	1700	32472	
1750	1700	32472	
1875	1530	33895	
2000	1530	33895	
2250	1390	34963	
2500	1280	35408	
2750	1180	54090	
3000	1100	56670	
3250	1020	66145	
3500	960	Beyond	
3750	900	Max.	
4000	900	Speed	

* Average life is approximately seven times the minimum life.

Precision Line Boring Bushings Reduce Machine Downtime and Improve Quality



- Quick-Change Cartridge Design
- Built-In Precision
- Friction-Free Rotation

- Reduced Downtime
- Consistent Part Quality
- Improved Process Capability

Gatco's Precision Line Boring Bushings are most commonly used to support line boring bars during machining. A typical application is the cam and crank bores in engine blocks, although they are well suited for any operation where close tolerances must be maintained and friction-free support is required. They help to achieve zero tolerances and can significantly increase a process CPK value. Machine downtime is reduced due to the quick-change, cartridge-style design of the bushings.

precision cuts. All bearing units are sealed to protect against contaminants.

Some of the special features available on Gatco Line Boring Bushings are drive keys, clearance slots, air purge provisions, timing leads and lockout mechanisms. Each critical dimension is ground and lapped to size and monitored throughout the entire process by statistical process control techniques.

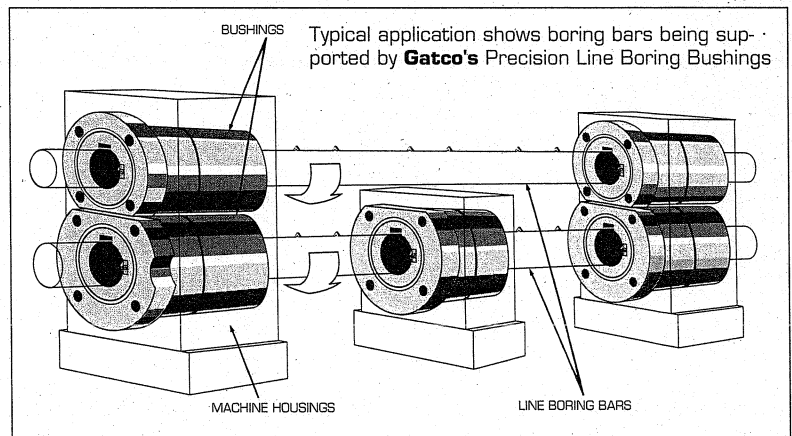
In operation, these bushings are mounted in a machine housing. The line boring bar passes through the inside diameter of the bushing and rotates friction-free supported by precision bearings. Since each application is unique, the bushings are designed and built to meet each customer's specific needs.

Many machine designs require the components which make up the bearing support to be assembled directly in the machine housing. This requires that the housing be pulled off the machine, rebuilt and realigned, or rebuilt on the production line. In either case, considerable downtime is experienced.

Gatco Bushings simplify this process and dramatically reduce downtime because the cartridge bushing can be slipped into the machine housing bore and bolted in place within a matter of minutes. Realignment is not required since the outside diameters of the bushings are tightly fit to the housing bores. Another advantage is that all adjustments are made at **Gatco's** factory and the bushings are ready to run once in place.

Gatco Line Boring Bushings are made from high grade bearing quality steel. The units consist of a stationary outer case and an inner liner which rotates with the boring bar. Precision bearings are used in every bushing to provide close I.D. runout.

These bearings can handle any radial or axial load that may be generated and also provide the rigidity required to produce



In addition, each unit is 100 percent inspected before shipping to the customer.

Gatco offers various rebuilding programs as a service to their customers. These programs relieve the customer of the difficulties encountered rebuilding and maintaining precision tolerances in the supports. After a unit is rebuilt, bushing sizes and runout tolerances will meet original specifications.

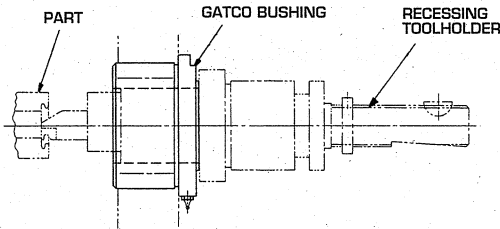
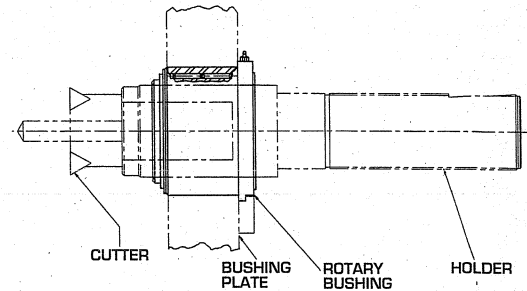
Gatco also rebuilds housings designed with component parts to service older machines still in operation. Quick-change cartridge bushings manufactured by **Gatco, Inc.** often can be incorporated into these housings requiring little or no modification.

TYPICAL BUSHING APPLICATIONS

Gatco Rotary Bushings can be incorporated into many machining operations requiring precision machined parts. They provide superior support of rotating cutting tools while eliminating friction and wear. Rotary bushings are commonly incorporated into older equipment as well as new. With the demand for continuous improvement and tighter tolerances, **Gatco Rotary Bushings** are the answer to your machining problems.

TYPICAL ROTARY BUSHING SUPPORT APPLICATION

Rotary bushings are commonly used to support and guide shank type holders. They eliminate the wear of the holder pilot diameter, whether this surface is bronze, carbide, or hardened steel wear strips. Rotary bushings are commonly incorporated as an after market replacement for the drill bushings which may have originally been designed in. A rotary bushing can usually be incorporated by simply removing the liner and drill bushing from the bushing plate and replacing it with a rotary bushing.

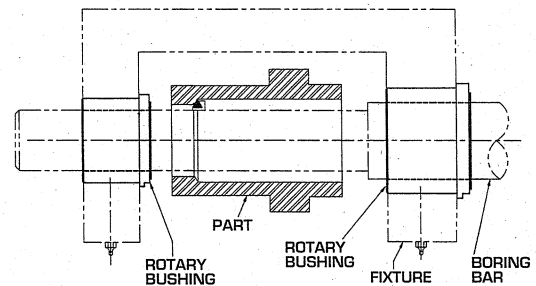


TYPICAL BOKUMATIC RECESSING APPLICATION

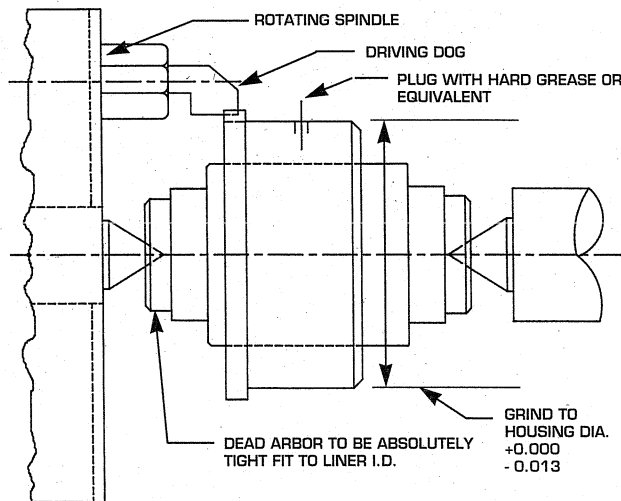
As shown in the drawing at left, **Gatco** offers a standard line of rotary bushings designed specifically for use with recessing toolholders. Their unique construction incorporates a radial bearing to accept side loads as well as a thrust bearing to accept axial loads generated by the toolholder activating mechanism and the cutting forces. Recessing bushings can be used in any operation where axial forces are encountered.

TYPICAL BORING APPLICATION

One of the most common operations for a rotary bushing is boring. The drawing at right demonstrates a typical boring operation where the process requires straight and round holes be bored and tight tolerances held. Stationary bushings are unacceptable due to their high wear characteristics which is not tolerable. Rotary bushings can be adapted to most boring applications.



O.D. GRINDING PROCEDURE



prior to installation. As illustrated, an arbor must be ground for an absolutely tight, or light press fit to the I.D. of the rotary bushing liner and, with the rotary bushing, is mounted between centers. A drive dog, attached to the machine spindle, is engaged in the manufacturing slot provided in the flange of the outer case. The lubrication hole (for those models with a hole and not a fitting) should be plugged with hard grease. By leaving the arbor "dead" and rotating the outer case with the drive dog, the case O.D. is then ground concentric with the liner I.D. to size determined by the existing or specified housing bore (refer to the figure). An offset clamp may be required at final installation to retain the bushing in the bushing plate.

Sizes GNM-500 through GNM-1375 have one bearing only, which permits the liner to cant slightly as the rollers are crowned. Live arbor grinding is necessary. When O.D. grinding, follow the above procedure, except drive the arbor and inner liner with the outer case. The inner liner must be locked up to prevent radial movement during grinding. Because the rollers are crowned, I.D. runout must be checked in the center of the needle bearing, at approximately the 2/3 point inside the bushing I.D. from the flange end.

INSTALLATION

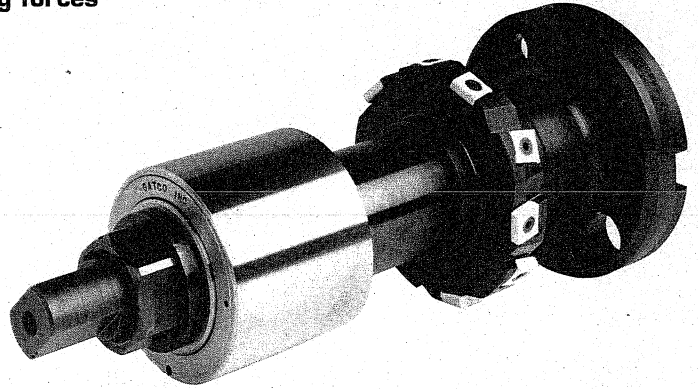
GATCO Anti-Friction Rotary Bushings are furnished with .5 grind stock on the O.D. of the outer case to permit selective fitting. (Finish ground O.D.'s are available at extra cost). The figure above shows the simple grinding procedure necessary

NOTE:

Grind underside of flange when O.D. grinding to insure O.D. & shoulder are square.

Precision Milling Machine Arbor Bushings Eliminate Vibration and Chatter

- Helps dampen and evenly distribute cutting forces
- Eliminates vibration and chatter
- Eliminates excessive mounting clearances
- Sealed to protect bearings from contamination
- Unique cartridge design simplifies replacement
- Incorporates heavy-duty bearings
- Wide selection of I.D., O.D. and length combinations



Milling machine arbor bushing supports receive the most abuse in milling applications, next to the cutters themselves. Quite often, however, milling arbor assemblies are designed and built with little thought given to proper mounting, fit or calibration of the precision bearings, resulting in chatter, vibration and premature failure of the cutters and bushings. **Gatco** Rotary Milling Arbor Bushings eliminate these problems.

Horizontal milling creates heavy intermittent radial loads on the milling arbor. **Gatco** Bushings provide the rigid support

necessary to evenly distribute these forces, and their unique design allows them to rotate at high speeds virtually friction-free. They are capable of handling heavy loads and interrupted cuts while maintaining cutting accuracy.

Gatco offers a complete line of milling machine bushings for production machines as well as stand-alone horizontal milling machines. These bushings simply slip on the milling arbor at assembly and are secured when the arbor nut is drawn tight. All fitting and calibration is done by **Gatco** at the factory.

Types of Milling Machine Bushings

Three types of milling machine bushings are available:

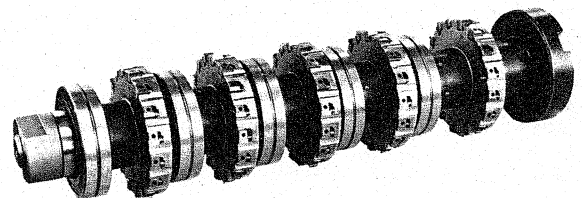
OUTBOARD SUPPORT BUSHINGS are mounted on the end of the milling arbor opposite the spindle. This bushing is critical because it has to be capable of handling the high forces generated by the cut and still have the accuracy to hold finish part tolerances.

MID-SUPPORT BUSHINGS are mounted on gang arbors and can be positioned anywhere between the spindle and the outboard support bushing. Mounted directly on the arbor, the bushings may be incorporated either singly or in multiples for adequate support. Overall length is held so that they also act as a spacer.

TAPERED O.D. BUSHINGS are most commonly used to support milling arbors on stand-alone tool room horizontal milling machines. They replace the tapered O.D. bronze bushings commonly designed into these machines.

Although a large number of dimensional combinations are available, **Gatco** Rotary Bushings may be designed and built to meet the requirements of particular applications. Considering the improvements in milling performance and tool life, **Gatco** bushings are a practical and economical addition to any milling machine.

Milling machine bushings are not cataloged due to the numerous variations. Call or FAX **Gatco** with your milling arbor requirements (see pg. 16).

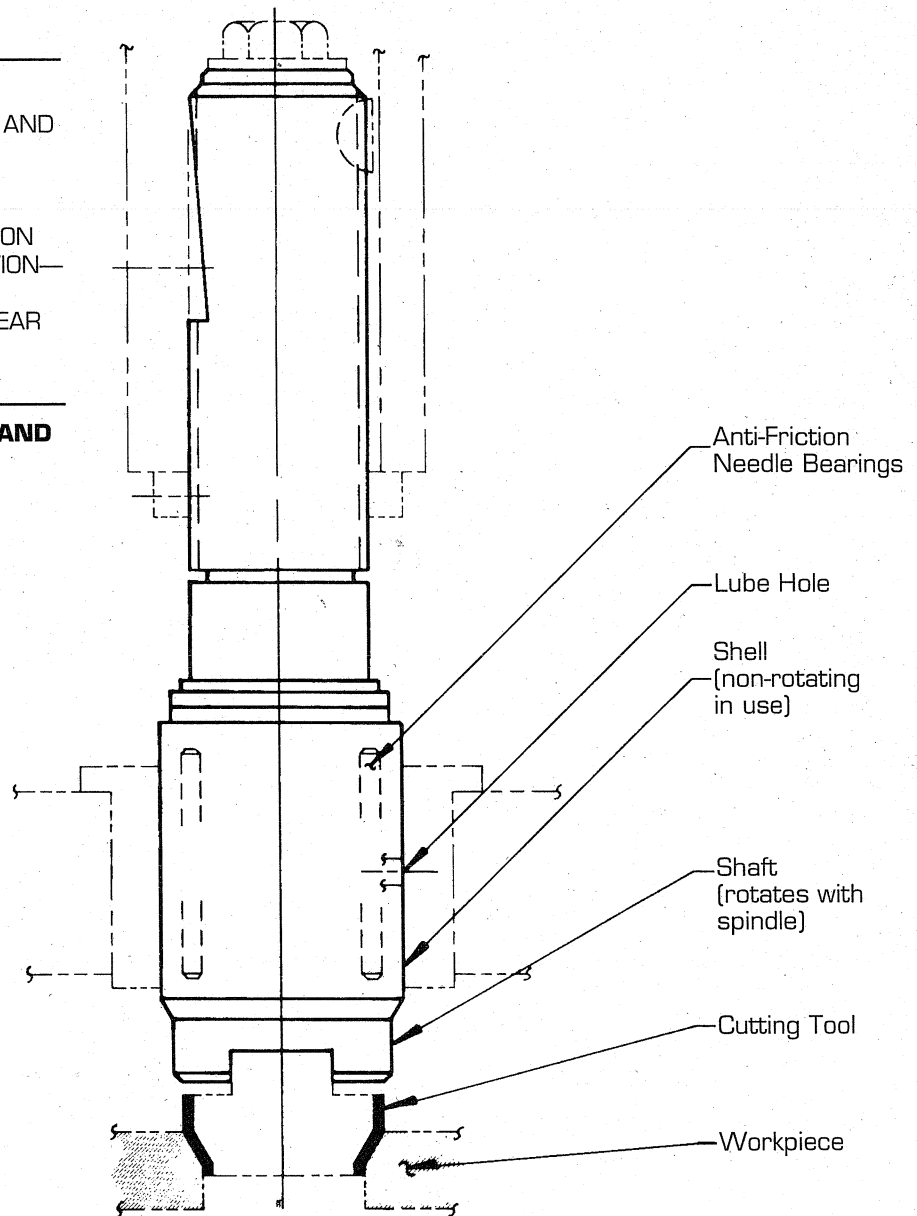


ANTIFRICTION ROTARY TOOLHOLDERS

ROTARY TOOLHOLDER ADVANTAGES

- + ELIMINATES WEAR STRIPS
- + IMPROVES CUTTING TOOL LIFE AND PERFORMANCE
- + FRICTION FREE OPERATION
- + INCREASES ACCURACY
- + MINIMIZES THERMAL EXPANSION
- + ENABLES HIGH SPEED OPERATION—HEAVIER CUTS
- + MINIMAL SUPPORT SLEEVE WEAR
- + ELIMINATES CHATTER
- + REDUCES DOWNTIME

= **INCREASED PRODUCTIVITY AND REDUCED PER UNIT COST**



DESCRIPTION

GATCO Anti-Friction Rotary Toolholders (Patented) are a combination of a solid toolholder with an exterior bearing assembly. They are far superior to solid toolholders in **that they eliminate the need for adjustable wear strips, thereby eliminating adjusting downtime.** Due to "friction-free" bearing construction, operating temperatures are lowered, permitting **higher speeds** while **eliminating chatter and guide sleeve wear.** Their compact construction allows **close center-to-center distances.** Through precision manufacturing, tight tolerances are achieved. While more expensive than solid toolholders, the **cost per piece machined is dramatically lowered,** due to virtually no downtime caused by bushing or holder wear normally encountered with solid toolholders. At the same time, **scrapage is minimized and tool life is extended.**

PRODUCT DESCRIPTION

Construction

Rotary Toolholders consist of:

1. **Outer Shell** - Hardened steel, O.D. precision ground to size and tolerance shown. Non-rotating in use.
2. **Rotating Shaft** - Hardened steel, precision ground to size and tolerance shown. Toolholders are provided with four standard types of tool sockets from which to choose. [additional socket and shank combinations are available]
3. **Bearings** - Caged needles provide anti-friction rotation and radial load support.
4. **Seals** - Seal and rear flinger extend the life of the Rotary Toolholder.
5. **Lubrication** - Lubricated with light duty general purpose grease. Lube hole provided for maintenance lubrication.

Note: Woodruff key, stop nut and drawbar are not included.

Special Design and Features

Special Toolholders and modified standards can be designed for specific applications. Rotary Toolholders can be furnished with tapered shanks, special O.D.'s, special lengths, etc.. **Special Rotary Toolholders designed and quoted upon request.** Contact **Gatco's** Engineering Dept. or FAX a sketch of your needs (see pg. 17).

Operation

In operation, a **GATCO Anti-Friction Rotary Toolholder** is guided by a support sleeve as it travels toward the workpiece. The recommended close tolerance fit (0.007 to 0.013 clearance) of the shell to the support sleeve restricts the shell from rotating. The Toolholder shaft rotates friction free within the needle bearings providing an accurate, chatter free operation.

In addition, the anti-friction rotation all but eliminates heat build-up and thermal expansion, greatly increasing the life of the Toolholder, the support sleeve and the tooling. Also, higher operating speeds can be achieved. This ultimately results in a lower cost per piece machined.

Rebuilding Program

All Rotary Toolholders can be rebuilt provided the shaft and/or socket is not damaged. This restores the Toolholders to their original T.I.R. accuracy and life expectancy. **Gatco, Inc.** cannot be responsible for Toolholders rebuilt or modified by anyone other than **Gatco, Inc.**

Maintenance

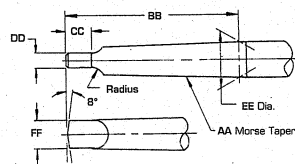
GATCO Anti-Friction Rotary Toolholders are lubricated at the factory. Through simple basic maintenance procedures, **Gatco** customers can extend the useful life of their Rotary Toolholders by using the lubrication hole provided in the outer shell.

SEE INSIDE FRONT COVER FOR LUBRICATION RECOMMENDATIONS

SUGGESTED CUTTING TOOL SHANK DIMENSIONS

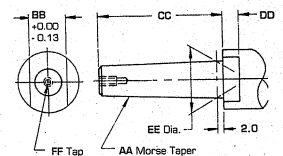
FAM-SERIES MORSE TAPER SHANK WITH TANG DRIVE

AA	BB	CC	DD	EE	FF
1	62.0	9.4	5.16	12.07	8.6
2	74.7	10.9	6.35	17.78	13.5
3	93.7	14.2	7.92	23.83	18.3
4	117.3	15.7	11.89	31.27	24.6



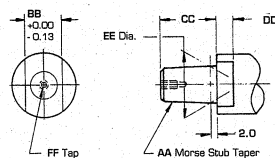
FBM-SERIES MORSE TAPER SHANK WITH DRIVE FLATS

AA	BB	CC	DD	EE	FF
0	10.87	50.0	6.1	9.04	M4x.7
1	12.88	54.9	7.9	12.07	M5x.8
2	19.86	65.0	8.9	17.78	M6x1.
3	24.87	81.0	10.9	23.83	M8x1.25
4	31.88	103.1	13.0	31.27	M8x1.25



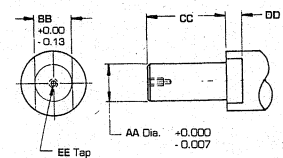
FCM-SERIES MORSE STUB TAPER SHANK WITH DRIVE FLATS

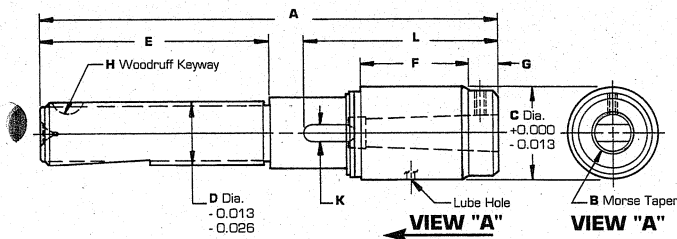
AA	BB	CC	DD	EE	FF
0	10.87	23.1	6.1	9.04	M4x.7
1	12.88	24.9	7.9	12.07	M5x.8
2	19.86	32.0	8.9	17.78	M6x1.
3	24.87	37.1	10.9	23.83	M8x1.25
4	31.88	43.9	13.0	31.27	M8x1.25



FDM-SERIES STRAIGHT SHANK WITH DRIVE FLATS

AA	BB	CC	DD	EE
9.995	10.87	22.9	6.1	M4x.7
11.994	12.88	27.9	7.9	M5x.8
15.994	17.86	36.1	8.9	M6x1.
18.994	19.86	42.9	8.9	M6x1.
23.995	24.87	53.8	10.9	M8x1.25
30.996	31.88	69.9	13.0	M8x1.25





FAM SERIES

MORSE TAPER SOCKET WITH TANG DRIVE

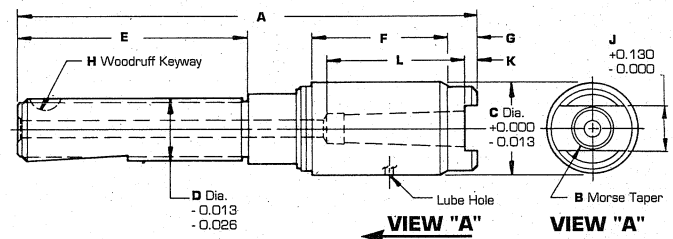
- Socket runout within 0.013 T.I.R.
- Radial capacities based on 1500 hours B₁₀ bearing life at 300 R.P.M.
- Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see page 17).

FAM NO.	A	B	C	D	E	F	G	H	K	L	Radial N	Limiting Speed RPM
3	165.0	1	36.000	20x2	86.0	37.1	10.9	5x7.5	5.54	71.4	5338	10800
4	190.0	1	36.000	20x2	86.0	37.1	10.9	5x7.5	5.54	71.4	5338	10800
5	216.0	1	36.000	20x2	86.0	37.1	10.9	5x7.5	5.54	71.4	5338	10800
6	184.0	1	42.000	24x2	95.0	37.1	10.9	6x9	5.54	71.4	8007	8400
7	209.0	1	42.000	24x2	95.0	37.1	10.9	6x9	5.54	71.4	8007	8400
8	235.0	1	42.000	24x2	95.0	37.1	10.9	6x9	5.54	71.4	8007	8400
9	184.0	2	42.000	24x2	95.0	50.0	10.9	6x9	6.76	82.6	8007	8400
10	209.0	2	42.000	24x2	95.0	50.0	10.9	6x9	6.76	82.6	8007	8400
11	235.0	2	42.000	24x2	95.0	50.0	10.9	6x9	6.76	82.6	8007	8400
12	209.0	2	45.000	28x2	95.0	46.2	16.0	6x9	6.76	82.6	12900	7800
13	235.0	2	45.000	28x2	95.0	46.2	16.0	6x9	6.76	82.6	12900	7800
14	260.0	2	45.000	28x2	95.0	46.2	16.0	6x9	6.76	82.6	12900	7800
15	235.0	2	51.000	36x2	118.0	45.0	16.0	8x11	6.76	82.6	11565	6600
16	270.0	2	51.000	36x2	118.0	45.0	16.0	8x11	6.76	82.6	11565	6600
17	305.0	2	51.000	36x2	118.0	45.0	16.0	8x11	6.76	82.6	11565	6600
18	235.0	3	51.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	11565	6600
19	270.0	3	51.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	11565	6600
20	305.0	3	51.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	11565	6600
21	235.0	3	64.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	16458	5400
22	270.0	3	64.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	16458	5400
23	305.0	3	64.000	36x2	118.0	59.9	16.0	8x11	8.33	108.0	16458	5400
25	270.0	4	64.000	36x2	118.0	81.0	16.0	8x11	12.29	130.0	16458	5400
26	305.0	4	64.000	36x2	118.0	81.0	16.0	8x11	12.29	130.0	16458	5400
27	254.0	3	70.000	48x2	144.0	59.9	16.0	10x13	8.33	108.0	17348	4800
28	292.0	3	70.000	48x2	144.0	59.9	16.0	10x13	8.33	108.0	17348	4800
29	330.0	3	70.000	48x2	144.0	59.9	16.0	10x13	8.33	108.0	17348	4800
31	292.0	4	70.000	48x2	144.0	81.0	16.0	10x13	12.29	130.0	17348	4800
32	330.0	4	70.000	48x2	144.0	81.0	16.0	10x13	12.29	130.0	17348	4800

FBM SERIES

MORSE TAPER SOCKET WITH DRIVE FLATS

- Socket runout within 0.013 T.I.R.
- Radial capacities based on 1500 hours B₁₀ bearing life at 300 R.P.M.
- Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see page 17).

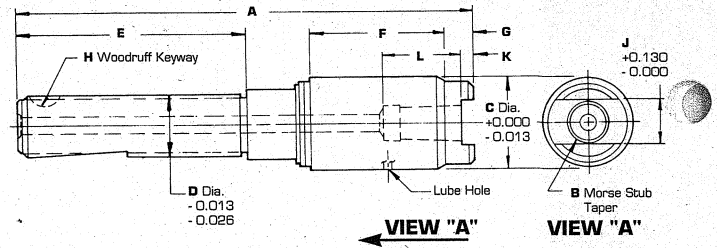


FBM NO.	A	B	C	D	E	F	G	H	J	K	L	Radial N	Limiting Speed RPM
1	159.0	0	32.000	16x1.5	86.0	50.8	10.9	5x6.5	11.00	4.1	54.9	10676	12600
2	184.0	0	32.000	16x1.5	86.0	50.8	10.9	5x6.5	11.00	4.1	54.9	10676	12600
3	165.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	59.9	5338	10800
4	190.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	59.9	5338	10800
5	216.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	59.9	5338	10800
6	184.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	59.9	8007	8400
7	209.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	59.9	8007	8400
8	235.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	59.9	8007	8400
9	184.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	72.9	8007	8400
10	209.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	72.9	8007	8400
11	235.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	72.9	8007	8400
12	209.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	72.9	12900	7800
13	235.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	72.9	12900	7800
14	260.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	72.9	12900	7800
15	235.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	72.9	11565	6600
16	270.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	72.9	11565	6600
17	305.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	72.9	11565	6600
18	235.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	88.9	11565	6600
19	270.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	88.9	11565	6600
20	305.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	88.9	11565	6600
21	235.0	3	64.000	36x2	118.0	81.0	16.0	8x11	24.99	8.9	88.9	16458	5400
22	270.0	3	64.000	36x2	118.0	96.0	16.0	8x11	24.99	8.9	88.9	16458	5400
23	305.0	3	64.000	36x2	118.0	96.0	16.0	8x11	24.99	8.9	88.9	16458	5400
25	270.0	4	64.000	36x2	118.0	96.0	16.0	8x11	32.00	10.9	111.0	16458	5400
26	305.0	4	64.000	36x2	118.0	96.0	16.0	8x11	32.00	10.9	111.0	16458	5400
27	254.0	3	70.000	48x2	144.0	81.0	16.0	10x13	24.99	8.9	88.9	17348	4800
28	292.0	3	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	88.9	17348	4800
29	330.0	3	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	88.9	17348	4800
30	254.0	4	70.000	48x2	144.0	81.0	16.0	10x13	32.00	10.9	111.0	17348	4800
31	292.0	4	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	111.0	17348	4800
32	330.0	4	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	111.0	17348	4800

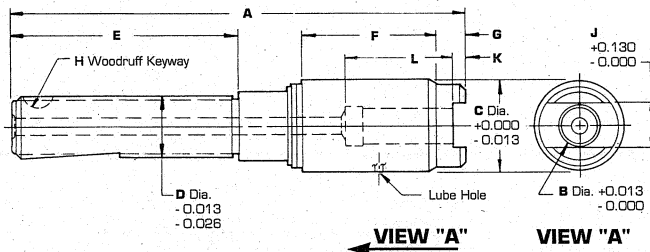
FCM SERIES

MORSE STUB TAPER SOCKET WITH DRIVE FLATS

- Socket runout within 0.013 T.I.R.
- Radial capacities based on 1500 hours B₁₀ bearing life at 300 R.P.M.
- Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see page 17).



FCM NO.	A	B	C	D	E	F	G	H	J	K	L	Radial N	Limiting Speed RPM
1	159.0	0	32.000	16x1.5	86.0	50.8	10.9	5x6.5	11.00	4.1	27.2	10676	12600
2	184.0	0	32.000	16x1.5	86.0	50.8	10.9	5x6.5	11.00	4.1	27.2	10676	12600
3	165.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	27.9	5338	10800
4	190.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	27.9	5338	10800
5	216.0	1	36.000	20x2	86.0	54.1	10.9	5x7.5	13.00	6.1	27.9	5338	10800
6	184.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	27.9	8007	8400
7	209.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	27.9	8007	8400
8	235.0	1	42.000	24x2	95.0	63.0	10.9	6x9	13.00	6.1	27.9	8007	8400
9	184.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	35.1	8007	8400
10	209.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	35.1	8007	8400
11	235.0	2	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	35.1	8007	8400
12	209.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	35.1	12900	7800
13	235.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	35.1	12900	7800
14	260.0	2	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	35.1	12900	7800
15	235.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	35.1	11565	6600
16	270.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	35.1	11565	6600
17	305.0	2	51.000	36x2	118.0	75.9	16.0	8x11	19.99	7.1	35.1	11565	6600
18	235.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	40.9	11565	6600
19	270.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	40.9	11565	6600
20	305.0	3	51.000	36x2	118.0	75.9	16.0	8x11	24.99	8.9	40.9	11565	6600
21	235.0	3	64.000	36x2	118.0	81.0	16.0	8x11	24.99	8.9	40.9	16458	5400
22	270.0	3	64.000	36x2	118.0	81.0	16.0	8x11	24.99	8.9	40.9	16458	5400
23	305.0	3	64.000	36x2	118.0	81.0	16.0	8x11	24.99	8.9	40.9	16458	5400
24	235.0	4	64.000	36x2	118.0	81.0	16.0	8x11	32.00	10.9	48.0	16458	5400
25	270.0	4	64.000	36x2	118.0	81.0	16.0	8x11	32.00	10.9	48.0	16458	5400
26	305.0	4	64.000	36x2	118.0	81.0	16.0	8x11	32.00	10.9	48.0	16458	5400
27	254.0	3	70.000	48x2	144.0	81.0	16.0	10x13	24.99	8.9	40.9	17348	4800
28	292.0	3	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	40.9	17348	4800
29	330.0	3	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	40.9	17348	4800
30	254.0	4	70.000	48x2	144.0	81.0	16.0	10x13	32.00	10.9	48.0	17348	4800
31	292.0	4	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	48.0	17348	4800
32	330.0	4	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	48.0	17348	4800



FDM SERIES

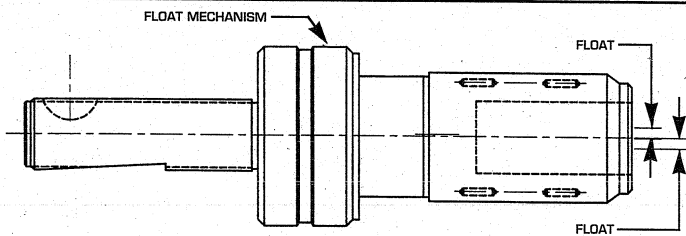
STRAIGHT SOCKET WITH DRIVE FLATS

- Socket runout within 0.013 T.I.R.
- Radial capacities based on 1500 hours B₁₀ bearing life at 300 R.P.M.
- Contact **GATCO** for sizes not listed in this catalog or FAX your requirements (see page 17).

FDM NO.	A	B	C	D	E	F	G	H	J	K	L	Radial N	Limiting RPM
1	159.0	10.000	32.000	16x1.5	85.9	50.8	10.9	5x6.5	11.00	4.1	25.9	10676	12600
2	184.0	10.000	32.000	16x1.5	85.9	50.8	10.9	5x6.5	11.00	4.1	25.9	10676	12600
3	165.0	12.000	36.000	20x2	85.9	54.1	10.9	5x7.5	13.00	6.1	32.0	5338	10800
4	190.0	12.000	36.000	20x2	85.9	54.1	10.9	5x7.5	13.00	6.1	32.0	5338	10800
5	216.0	12.000	36.000	20x2	85.9	54.1	10.9	5x7.5	13.00	6.1	32.0	5338	10800
6	184.0	16.000	42.000	24x2	95.0	63.0	10.9	6x9	17.98	7.1	39.9	8007	8400
7	209.0	16.000	42.000	24x2	95.0	63.0	10.9	6x9	17.98	7.1	39.9	8007	8400
8	235.0	16.000	42.000	24x2	95.0	63.0	10.9	6x9	17.98	7.1	39.9	8007	8400
9	184.0	19.000	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	48.0	8007	8400
10	209.0	19.000	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	48.0	8007	8400
11	235.0	19.000	42.000	24x2	95.0	63.0	10.9	6x9	19.99	7.1	48.0	8007	8400
12	209.0	19.000	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	48.0	12900	7800
13	235.0	19.000	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	48.0	12900	7800
14	260.0	19.000	45.000	28x2	95.0	68.1	16.0	6x9	19.99	7.1	48.0	12900	7800
15	235.0	19.000	51.000	36x2	118.1	75.9	16.0	8x11	19.99	7.1	48.0	11565	6600
16	270.0	19.000	51.000	36x2	118.1	75.9	16.0	8x11	19.99	7.1	48.0	11565	6600
17	305.0	19.000	51.000	36x2	118.1	75.9	16.0	8x11	19.99	7.1	48.0	11565	6600
18	235.0	24.000	51.000	36x2	118.1	75.9	16.0	8x11	24.99	8.9	59.9	11565	6600
19	270.0	24.000	51.000	36x2	118.1	75.9	16.0	8x11	24.99	8.9	59.9	11565	6600
20	305.0	24.000	51.000	36x2	118.1	75.9	16.0	8x11	24.99	8.9	59.9	11565	6600
21	235.0	24.000	64.000	36x2	118.1	81.0	16.0	8x11	24.99	8.9	59.9	16458	5400
22	270.0	24.000	64.000	36x2	118.1	81.0	16.0	8x11	24.99	8.9	59.9	16458	5400
23	305.0	24.000	64.000	36x2	118.1	81.0	16.0	8x11	24.99	8.9	59.9	16458	5400
24	235.0	31.000	64.000	36x2	118.1	81.0	16.0	8x11	32.00	10.9	79.0	16458	5400
25	270.0	31.000	64.000	36x2	118.1	81.0	16.0	8x11	32.00	10.9	79.0	16458	5400
26	305.0	31.000	64.000	36x2	118.1	81.0	16.0	8x11	32.00	10.9	79.0	16458	5400
27	254.0	24.000	70.000	48x2	144.0	81.0	16.0	10x13	24.99	8.9	59.9	17348	4800
28	292.0	24.000	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	59.9	17348	4800
29	330.0	24.000	70.000	48x2	144.0	104.9	16.0	10x13	24.99	8.9	59.9	17348	4800
30	254.0	31.000	70.000	48x2	144.0	81.0	16.0	10x13	32.00	10.9	79.0	17348	4800
31	292.0	31.000	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	79.0	17348	4800
32	330.0	31.000	70.000	48x2	144.0	104.9	16.0	10x13	32.00	10.9	79.0	17348	4800

TYPICAL TOOLHOLDER APPLICATIONS

Gatco Rotary Toolholders can be designed to suit any application. In addition to our four standard series, **Gatco** can design and build specials, incorporating coolant inducers, float mechanisms and insert pockets. Rotary Toolholders can normally be incorporated into an existing machine requiring no modifications to the machine itself. Contact **Gatco's** Engineering Department with your specifications.

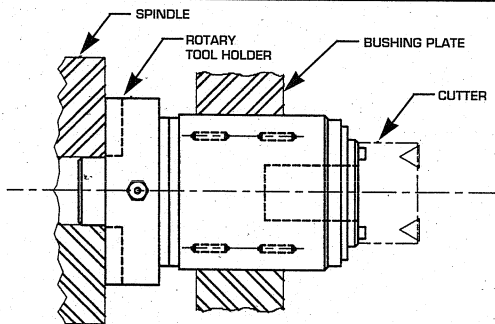
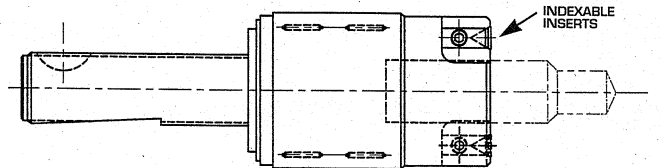


FLOATING ROTARY TOOLHOLDER

Rotary Toolholders can be designed to float, to allow for spindle misalignment. They allow the cutting tool to rotate on an offset centerline from the spindle. The float mechanism compensates for misalignment between the spindle and bushing plate. The anti-friction bearings provide rigid friction free support during the cut.

INDEXABLE ROTARY TOOLHOLDER

Rotary Toolholders can be provided with the cutting inserts mounted directly in the holder. They are commonly used in combination with other cutting tools such as drills or spot facers as shown at right.

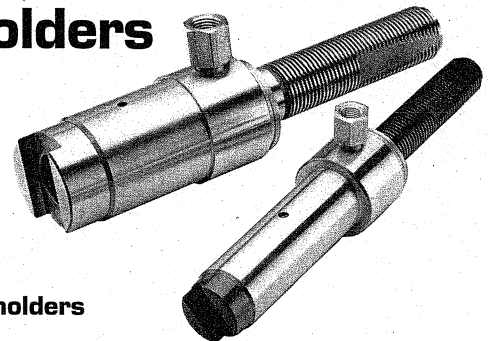


STUB ROTARY TOOLHOLDER

Stub Rotary Toolholders are commonly used when maximum support is required near the cut. They are compact, allowing minimum distance between the spindle and the part being cut.

Coolant Induced Rotary Toolholders Reduce Cost and Increase Tool Performance

- Friction Free Rotation
- Flushes Chips From Cut
- Improves Surface Finish
- Reduces Downtime
- Holds Tighter Tolerances
- Ideal For Multiple Spindle Applications
- Replaces Conventional Toolholders



Gatco Precision Coolant-Induced Rotary Toolholders enhance the performance of cutting tools through their unique design. Anti-friction bearing rotation maintains tighter tolerances while the high pressure coolant flow produces better surface finishes. Commonly used for drilling, milling, boring, and porting operations, the toolholders may be adapted to any operation which can benefit from coolant being channelled to the cutting edge. With the high speeds necessary to cut certain materials, there is a need to blast chips from the cut with high pressure coolant. Pressurized coolant prevents tool breakage, dissipates heat and breaks chips as well as producing better surface finishes.

Gatco Toolholders also reduce costs by eliminating the need to modify or replace existing machines to obtain the benefits of coolant-induced machining. Many machine tool spindles such as multiple drill heads often cannot accommodate coolant through the spindle due to gearing or other obstructions. The **Gatco** Toolholder adapts to these machines easily for coolant delivery. Coolant-Induced Rotary Toolholders' com-

compact design allows for minimal centerline distances between spindles. They are commonly used to replace solid holders and holders with wear strips.

UNIQUE CONSTRUCTION

Coolant-Induced Rotary Toolholders consist of a rotating shaft in which the cutting tool is mounted, and an outer shell which houses precision bearings, providing support and friction-free rotation for the shaft. In operation, the shell pilots in a guide bushing, coolant flows through the inducer into the rotating shaft and out through the pores in the cutting tool.

The use of bearings not only eliminates friction and allows for higher rotational speeds, but also allows the shaft to rotate concentrically true to the seals in the coolant-inducer. This design concept prevents premature failure of the inducer seals due to misalignment as well as distortion caused by excessive starts and stops. All radial forces are absorbed by the bearings rather than the seals.

ROTARY BUSHING DESIGN FAX

SIMPLY PHOTOCOPY THIS FORM, FILL IN AND FAX TO US FOR IMMEDIATE DESIGN AND QUOTATION

COMPANY NAME: _____ PHONE NO.: _____
 ADDRESS: _____ FAX NO.: _____
 CONTACT NAME: _____ DATE: _____
 QUANTITY: _____ DELIVERY REQ'D.: _____

DESIGN SPECIFICATIONS

MACHINE NAME: _____ MACHINE NO.: _____
 OPERATION: _____ GATCO NUMBER IF MODIFIED: _____
 RPM: _____ MTL. BEING MACHINED: _____

CONSTRUCTION TYPE:

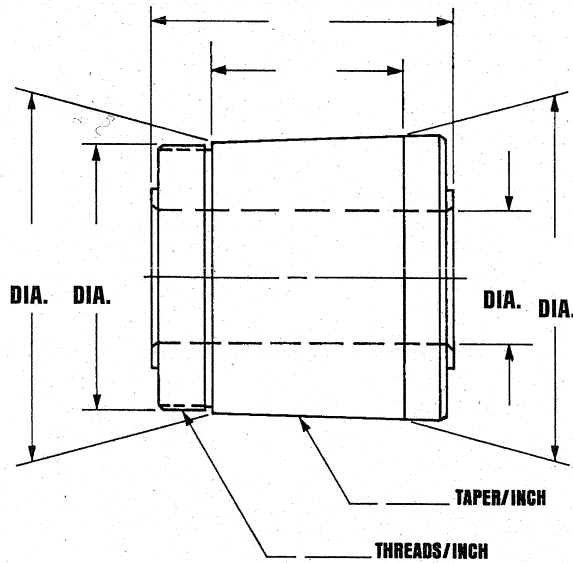
- M
- NM or GNM
- GTRM OR GTRSM
- GM
- GNTM
- GBM
- RECESSING

FEATURES: specify sizes

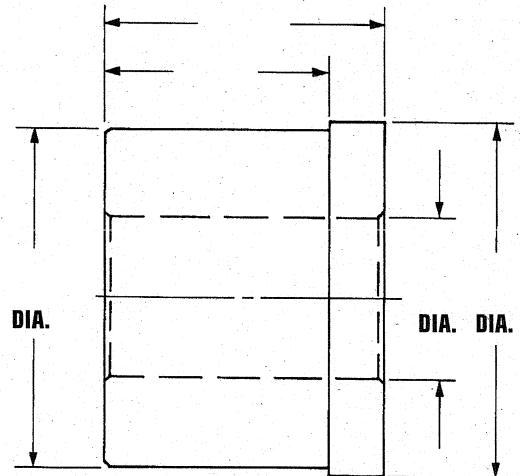
SLOTS: _____ KEYWAYS: _____
 T.I.R.: _____ FLATS: _____
 FACE GRIND: _____ ETCH: _____
 ROTATION: _____ O.D.G.: _____

COMMENTS: _____

FILL IN THE DIMENSIONS



ARBOR BUSHING



PILOT BUSHING

The above information is required for a special rotary bushing design and proposal. Please fill out as completely as possible, and provide additional prints, if available. Over-the-phone engineering assistance is available. Call us at:

Phone (734) 453-2295 • FAX (734) 453-2310

ROTARY TOOLHOLDER DESIGN FAX

**SIMPLY PHOTOCOPY THIS FORM, FILL IN AND FAX
TO US FOR IMMEDIATE DESIGN AND QUOTATION**

COMPANY NAME: _____ PHONE NO.: _____
ADDRESS: _____ FAX NO.: _____
CONTACT NAME: _____ DATE: _____
QUANTITY: _____ DELIVERY REQ'D.: _____

DESIGN SPECIFICATIONS

MACHINE NAME: _____ MACHINE NO.: _____
OPERATION: _____ GATCO NUMBER IF MODIFIED: _____
RPM: _____ MTL. BEING MACHINED: _____

CONSTRUCTION TYPE:

- FAM
- FBM
- FCM
- FDM

TYPICAL TOOLHOLDER SHANKS:

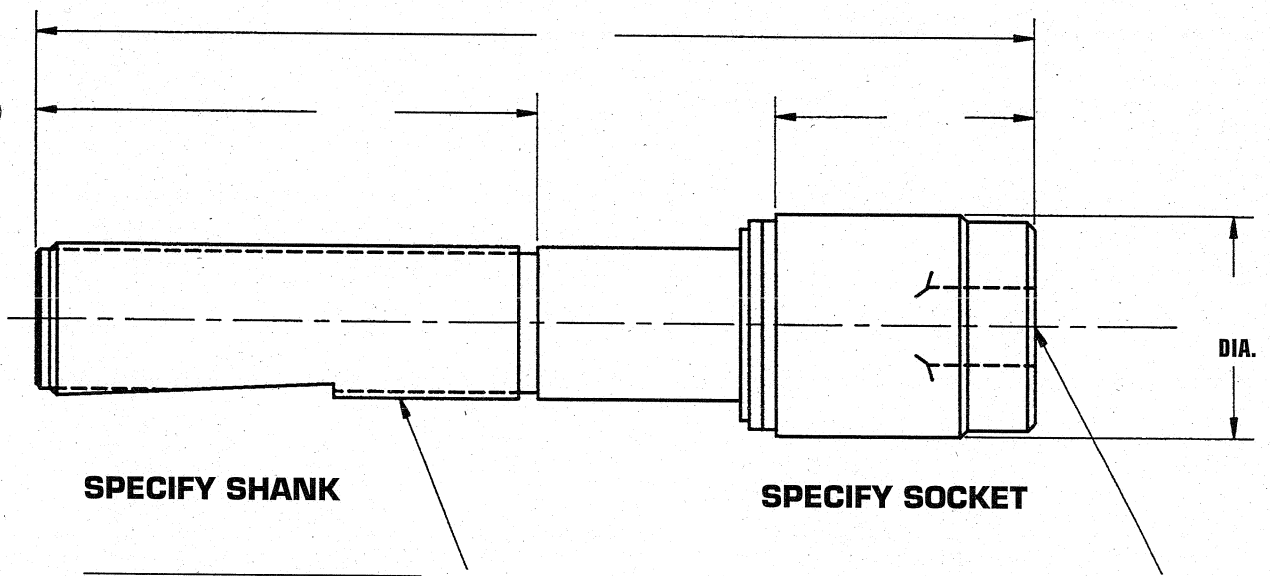
AUTOMOTIVE SHANK
STRAIGHT SHANK
MORSE TAPER SHANK
MALE PILOT

TYPICAL TOOLHOLDER SOCKETS:

MORSE TAPER MALE PILOT
MORSE STUB TAPER FEMALE PILOT
KOMET ABS MACON
ECLIPSE RADIAL STRAIGHT

COMMENTS: _____

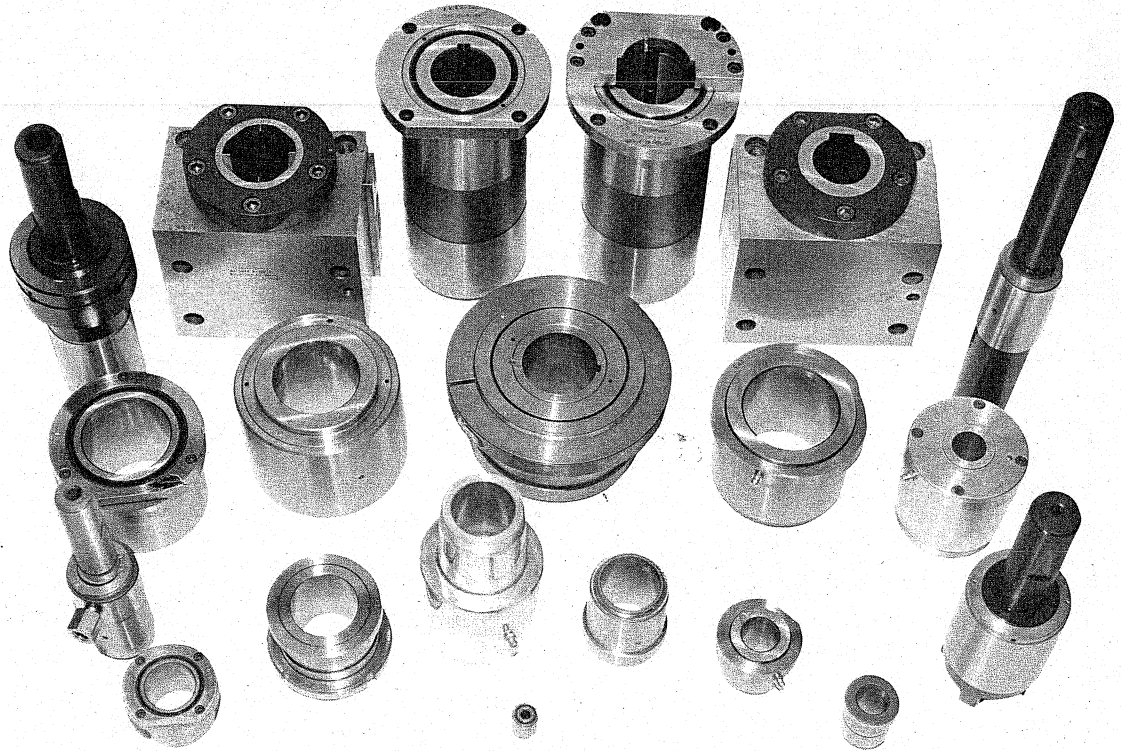
FILL IN THE DIMENSIONS



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Phone (734) 453-2295 • FAX (734) 453-2310

We invite inquiries on Special Sizes and Shapes to Meet Your Requirements!



Shown above is a recent sampling of customized anti-friction rotary bushings and toolholders designed and built to meet our customers special requirements.

Since its beginning, **Gatco, Inc.** has gone to great lengths to provide "special" Rotary Bushings of all shapes and sizes. Some of these are shown in the photo above. We have always felt that satisfied customers are important to us, and lead to repeat business. Consequently, we have never turned down a single request for a special type of rotary bushing or toolholder, no

matter how tough the application. If you have an application which cannot be filled with one of our standard series, don't hesitate to tell us about your problem. Send us a dimensioned sketch of the proposed application, and we will be glad to quote you on a rotary bushing or toolholder to satisfy your needs, at no obligation to you.

GATCO, INC. .

42330 E. Ann Arbor Road • Plymouth, Michigan 48170 USA • Phone (734) 453-2295 • FAX (734) 453-2310
Also visit our web site @ www.gatcobushing.com or e-mail us @ info@gatcobushing.com