RBC BEARINGS

Thin Section Ball Bearings

Thin Section Bearings

- RBC Thin Section Ball Bearings are engineered to solve a variety of design problems that cannot be solved with conventional ball bearings.

- **A bearing is considered a thin section bearing when the bore diameter is greater than four times the radial cross section**. Within any thin section bearing series, the cross section remains constant as the bore diameter changes. Typically the cross section is twice the ball diameter, and nominal dimensions are given in inches.

Thin Section Bearings

Some advantages of RBC Thin Section Ball Bearings are:

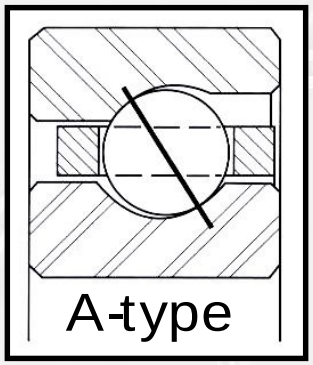
- Light weight
- Space Saving
- High stiffness
- Accurate positioning
- Reduced overall design costs
- Can be successfully used in numerous bearing applications
- Easily modified or customized
- Multi-load capabilities
- Variety of cross sections & sizes
- **RBC Thin Section Ball Bearings are most often found where space limitations, combined loading, and weight restrictions pose unique design requirements.**
- RBC also designs and manufactures special Thin Section Ball Bearings tailored for specific applications.

Thin Section Bearings

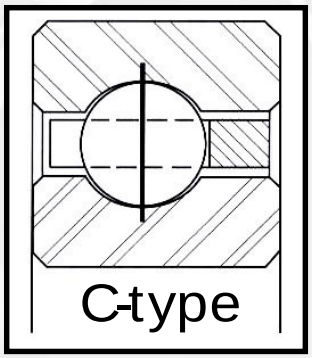
There are **three** basic types of RBC Thin Section Ball Bearings each of which is designed to provide maximum performance under different load conditions. The following chart can be used as a general guide for the selection of a bearing type:

		LOAD CONDITION				
Bearing Type	**Contact**	**Radial**	**Axial**	**Moment**	**Reversing Axial**	**Combined Radial-Thrust**
C	Radial	Excellent	Good	Good	Good	Good
A	Angular	Good	Excellent	Do Not Use	Do Not Use	Good
X	4-Point	Fair	Good	Excellent	Excellent	Fair

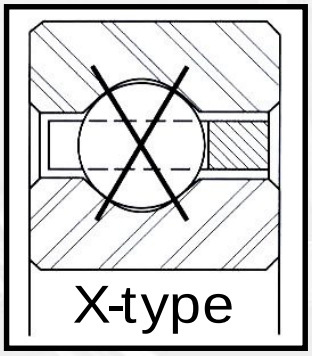
RBC Thin Section Bearings



Angular Contact



Radial Contact



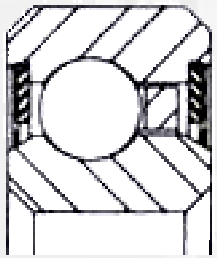
4 Point Contact

- Type “A” angular contact
  - 133 standard sizes
  - For High Axial Loads, radial, thrust
- Type “C” radial contact
  - 133 standard sizes
  - For High Radial loads, reversing and moment
- Type “X” 4 point contact
  - 135 standard sizes
  - For Moment loads, reversing axial

RBC Thin Section Bearings

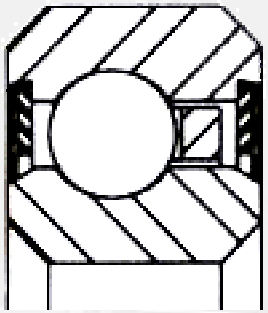
Sealed bearings

- 3 standard cross sections
- Bore sizes from 2” – 12”



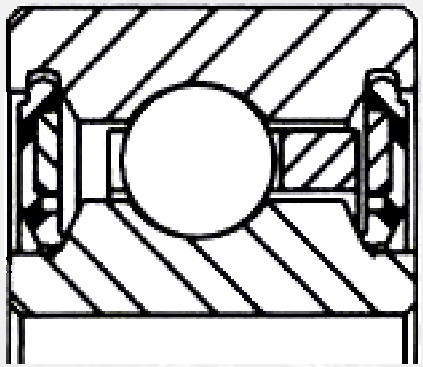
JA

1/4“ X 1/4”



JB

5/16” X 5/16”



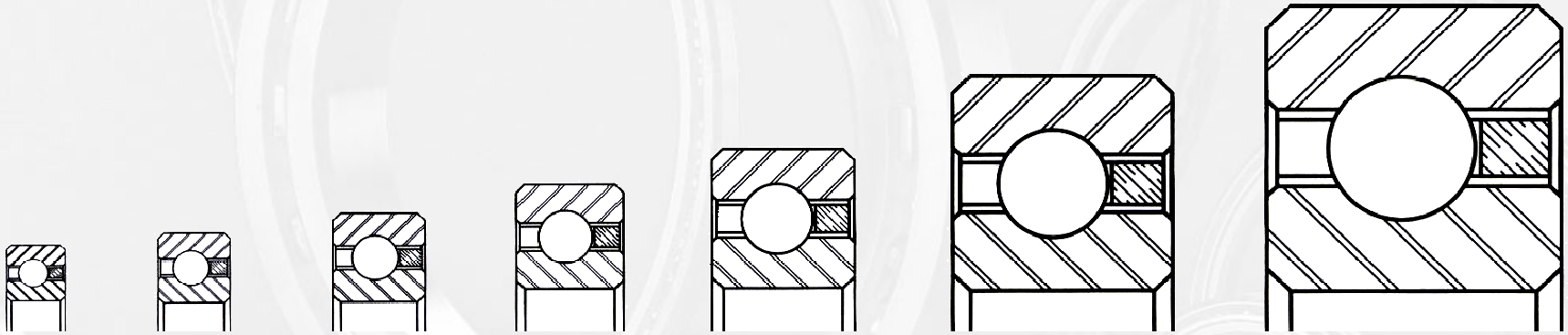
JU

1/2” X 3/8”

RBC Thin Section Bearings

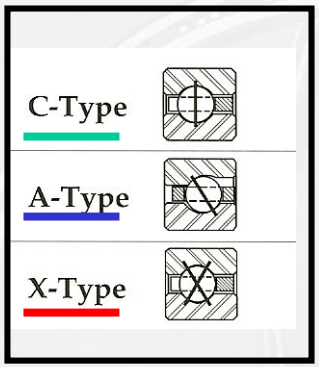
Open bearings

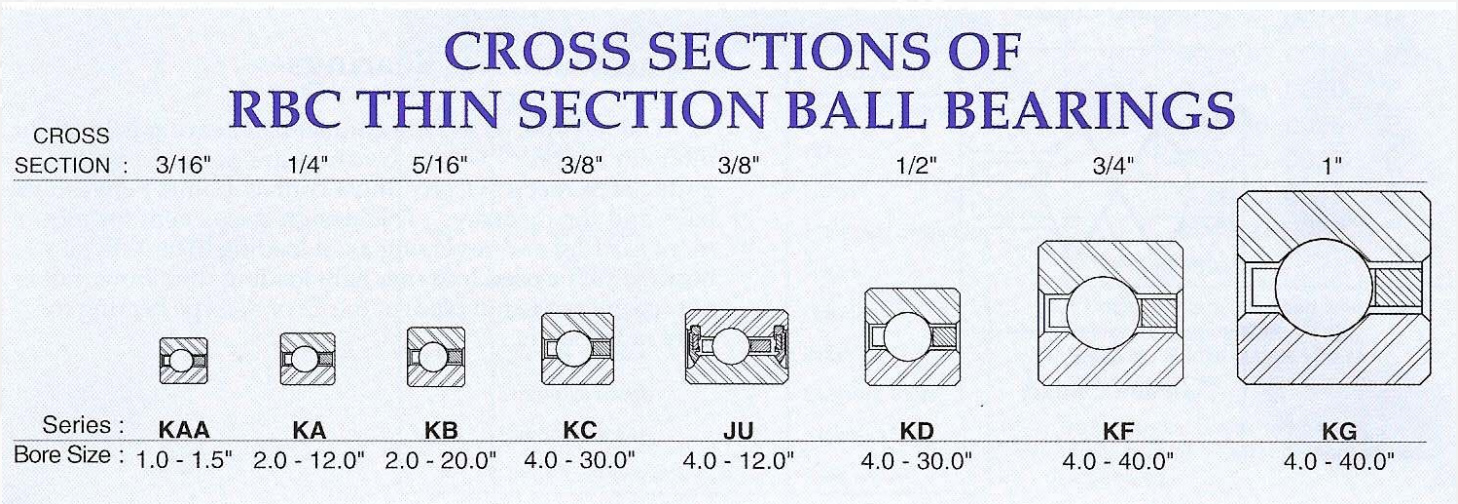
- 7 standard cross sections
- Bore sizes from 1” - 40”
- Special sizes available



KAA	KA	KB	KC	KD	KF	KG
3/16”	1/4”	5/16”	3/8”	1/2”	3/4”	1”

Thin Section Bearings





Series	Ball QTY Range	Radial Load (lbf) Static	Radial Load (lbf) Dynamic	Thrust Load (lbf) Static	Thrust Load (lbf) Dynamic	Moment (lbf-in) Static	Moment (lbf-in) Dynamic	Limit RPM Range
KAA	21 - 40	390	380	1,160	1,100	280	260	7,110 - 16,840
KA	27 - 196	3,200	1,100	9,600	3,200	17,640	5,580	980 - 8,890
KB	23 - 203	6,950	1,940	20,840	5,630	62,950	16,190	980 - 8,650
KC	35 - 345	12,620	3,060	37,870	8,870	162,040	36,790	400 - 4,710
JU	35 - 99	4,240	1,890	8,480	5,470	20,980	13,550	810 - 3,660
KD	27 - 244	18,190	4,940	54,560	14,320	249,630	62,170	390 - 4,440
KF	19 - 226	37,900	9,740	113,710	28,230	668,410	159,530	290 - 4,210
KG	15 - 164	58,300	17,000	174,910	49,300	1,047,360	287,670	290 - 4,000

Thin Section Bearings

EXAMPLE	K	A	1 2 0	X	P	0	M	*RBC
NOMENCLATURE	Material	Series	Size	Type	Separator	Precision	Radial Play	
POSITION	1	2	3 4 5	6	7	8	9**	

Position 1 - Material

	Rings, Balls	Seals, Shields, Coating
J	52100 Bearing Steel	Two seals - molded Buna N, steel reinforced
K	52100 Bearing Steel	No seals or shields
M	M-50 Tool Steel	No seals or shields
N	52100 Bearing Steel	Thin Dense Chrome plating
S	440 C Stainless Steel	No seals or shields
Z	Other	

Positions 3, 4, 5 - Size

Bore size (inches) multiplied by 10

Position 6 - Type

Type	Description
A	Angular contact single bearing
B	Back-to-back angular contact duplex pair
C	Radial contact
F	Face-to-face angular contact duplex pair
T	Tandem angular contact duplex pair
X	Four-point contact

Position 9 - Radial Play

Code		
A	.0000 to .0005	C
B	.0000 to .0010	C
C	.0005 to .0010	C
D	.0005 to .0015	C
E	.0010 to .0020	C
F	.0015 to .0025	C
G	.0020 to .0030	C
H	.0030 to .0040	C
I	.0040 to .0050	C
J	.0050 to .0060	C
K	.0000 to .0005	P
L	.0000 to .0010	P
M	.0005 to .0010	P
N	.0005 to .0015	P
P	.0010 to .0020	P
R	.0015 to .0025	P
S	.0020 to .0030	P
T	.0030 to .0040	P
U	.0040 to .0050	P
Z	Other	

Position 2 - Series

Series	Radial Thickness		Width
AA	0.187	x	0.187
A	0.250	x	0.250
B	0.312	x	0.312
C	0.375	x	0.375
D	0.500	x	0.500
F	0.750	x	0.750
G	1.000	x	1.000
U	0.375	x	0.500

Position 7 - Separator

Type	Design	Material
D	Snap-over cage	Phenolic Laminate
F	None (full complement)	N/A
G	Circular pocket	Nylon
H	Circular pocket	Phenolic Laminate
L	Snap-over cage	Nylon
P	Snap-over cage	Brass
R	Circular pocket	Brass
T	Snap-over cage	Stainless Steel
U	Circular pocket	Stainless Steel
Z	Other (toroids, spacer balls, etc.)	as specified

Position 8 - RBC Precision Class

Class	Description
0	ABEC 1F
3	ABEC 3F
4	ABEC 5F
6	ABEC 7F

Reference: ANSI/ABMA Std 26.2

**Position 9 only required when designating special radial play. Standard Radial play is shown in tolerance tables, pages 34 - 36.

Note: Radial preloaded bearings meet bore and O.D. tolerances prior to preload.

*The alphanumeric identification system is used under license.

Special Performance and Design Options

- ABEC 1,3,5, and 7 available
- Race materials: 440C, 17-4PH, M50
- Ball materials: 440C, ceramic
- Separator options: Phenolic, nylon, toroid, formed wire, spacer balls, full complement, helical coil springs

Special Performance and Design Options

- Thin Dense Chrome plating
- Special lubricants & coatings
- Special seal materials and designs for all cross sections
- Metric sizes and extra thin cross sections available
- Duplex pairs

Thin Section Bearings

Where are thin section bearings used?

In designs where Weight, Space or design limitations dictate their use.

In many bearing applications, the size of the bearing is the driving factor in their selection.

Aerospace: radar, targeting, sighting, munitions controls,	Military Equipment: tanks, launchers, missile seekers, gun turrets.
Semiconductor Industry	Harmonic Drives
Medical Equipment	Direct drive motors
Robots	Cargo Handling systems
Textile and Printing equipment	Agricultural, Industrial machinery

RBC BEARINGS

Optical Targeting – Fixed & Rotary Wing

Star Fire

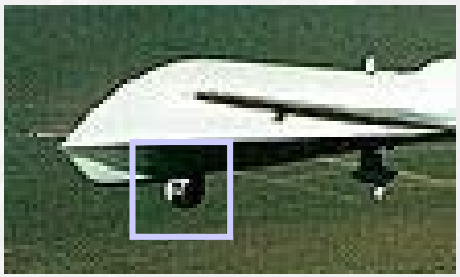
Attitude & Azimuth
Bearing Positions

Fixed Wing

FLIR Systems

Ultra-Media

UAV



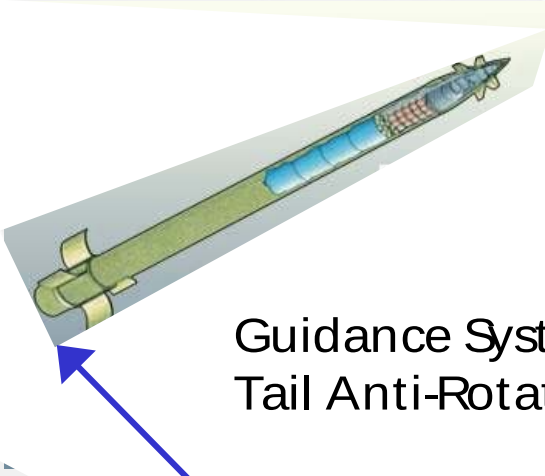
Rotary Wing

Optical Targeting and Infrared Systems

Helicopter Appl's

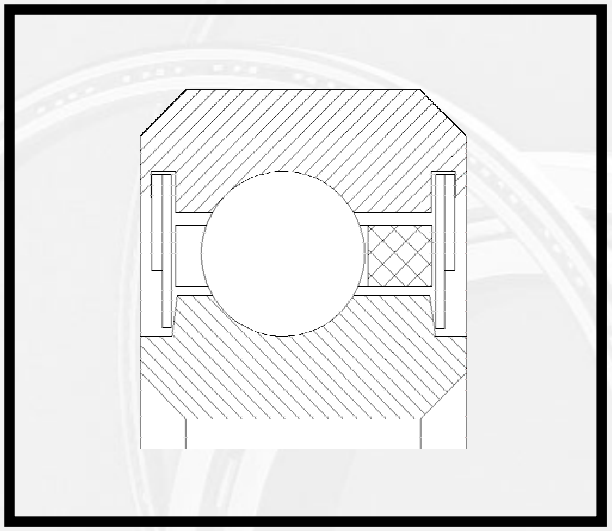
Optical Targeting

Missile

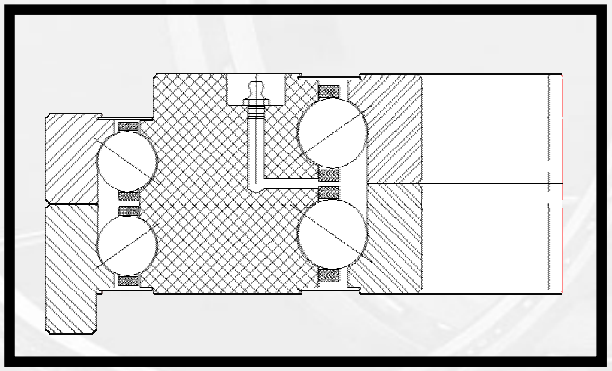


Guidance System 6.5” Thin Section
Tail Anti-Rotation Bearing

RBC Custom Designs

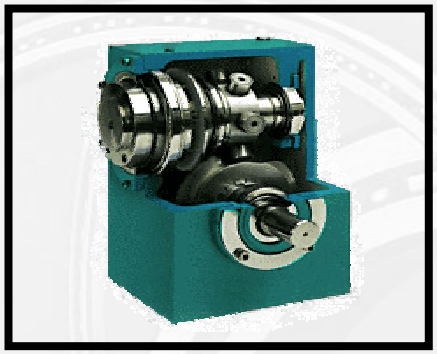


- Teflon seals
  - For low friction sealing ability in harsh environments



- Triple race
  - High speed semiconductor equipment with eccentric

Thin Section Bearing Applications



Indexer

Machine Tool

- Aircraft and aerospace
- Fixturing and workholding
- Food processing equipment
- Index and rotary tables
- Packaging equipment
- Machine tools

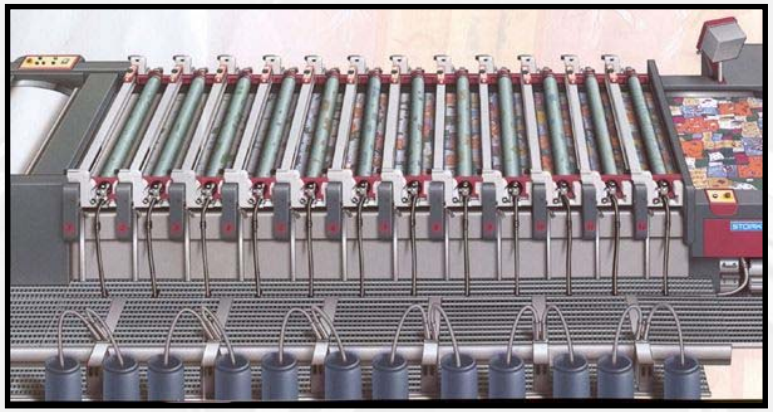
Thin Section Bearing Applications

Medical Scanner

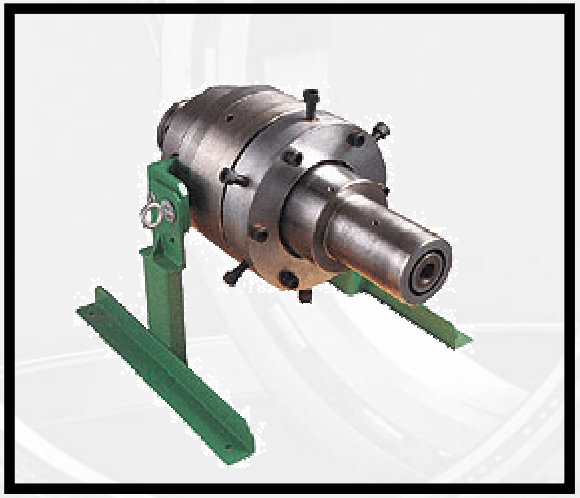
Semicon
Robot

- Medical devices
- Tire-making equipment
- Radar, satellite, and communications equipment
- Robotics and semiconductor manufacturing equipment

Thin Section Bearing Applications



Printing Machine

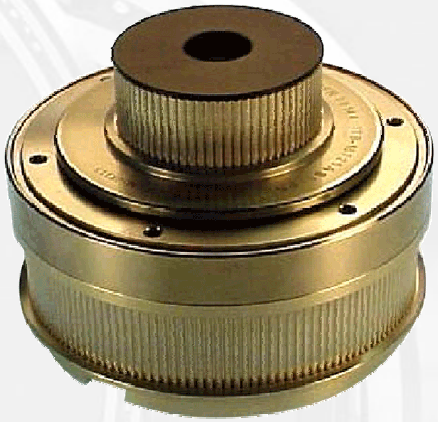


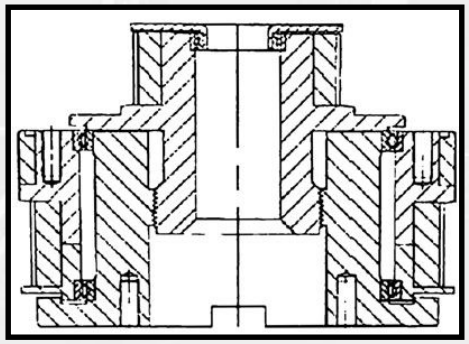
Tube and Pipe Cutter

- Polishing equipment
- Textile equipment
- Paper-making and converting equipment
- Printing machinery
- Specialized industrial equipment
- Tube and pipe cutting equipment

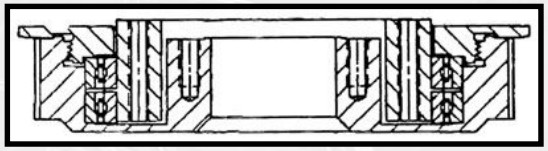
300mm CMP Robot

Elbow Assembly

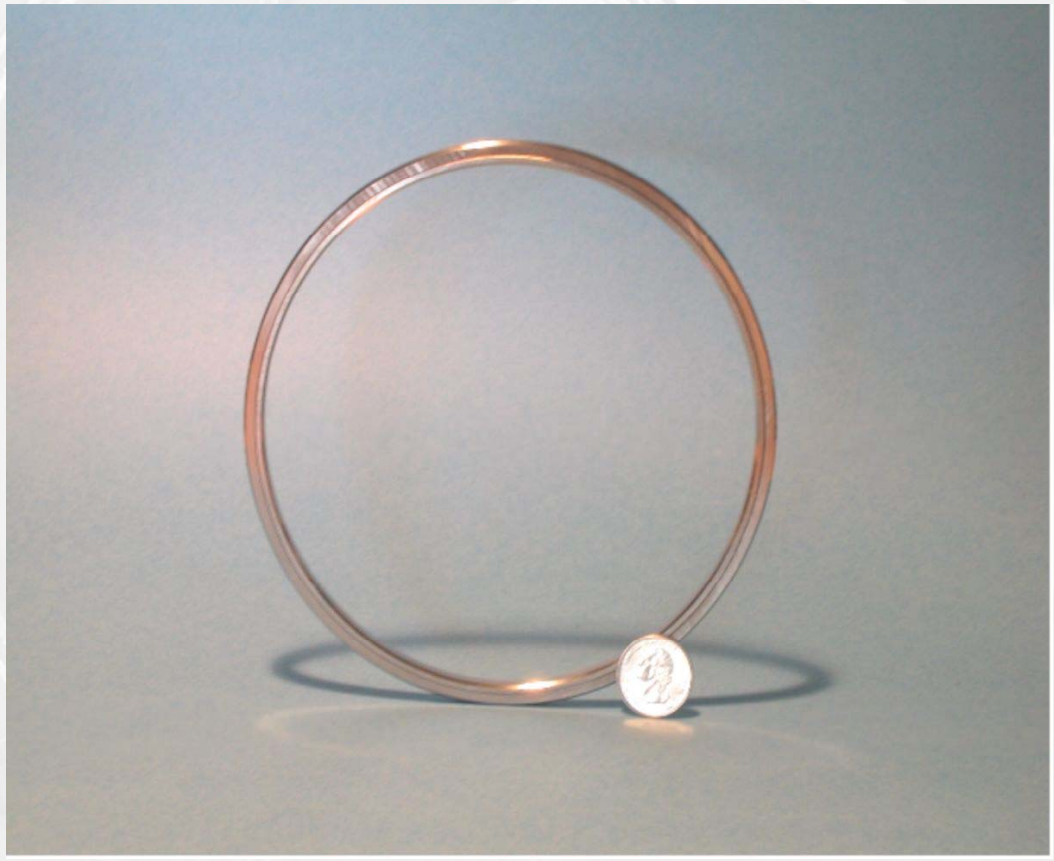




Wrist Assembly

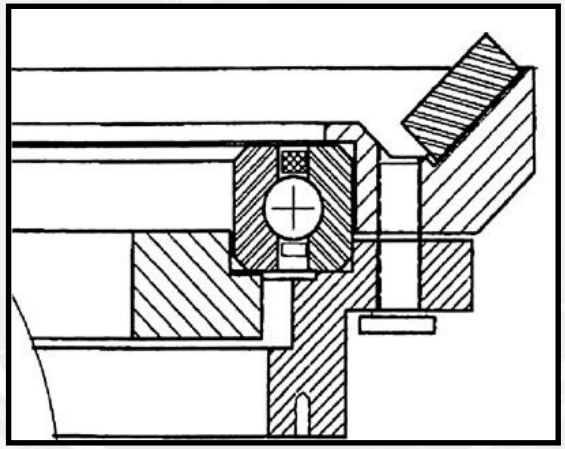


Robot Ceramic Hybrid Bearing Upgrade



- 6 inch 1/4” section
- Stainless Steel rings
- Ceramic balls
- Special lubrication
- Integral shields
- Reduced particles
- Extended Life

200mm Lower Rotation Assembly

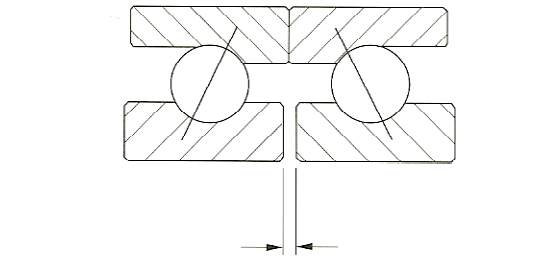


- Module includes:
  - 9” bearing
  - Magnet ring
  - Geared ring
  - Clamp ring

Duplex Pairs and Axial Preloading

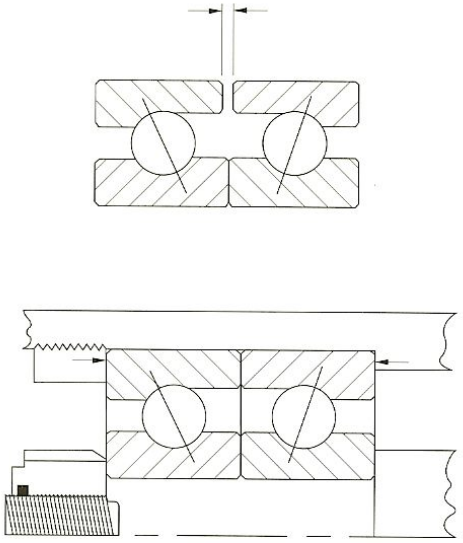
Duplex Pairs are a pair of angular contact bearings specially ground to be used as a matched set to provide higher accuracy, increased load capacity and higher stiffness. There are three basic mounting methods.

Back-to-Back, DB
B-Type



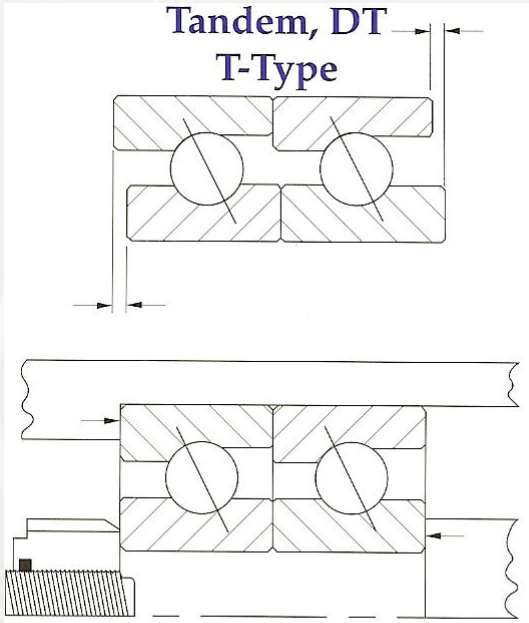
- Heavy radial loads
- Combined thrust & radial loads
- Reversing thrust load
- Excellent rigidity
- Moment loads

Face-to-Face, DF
F-Type



- Heavy radial loads
- Combined thrust & radial loads
- Reversing thrust load
- Moment loads

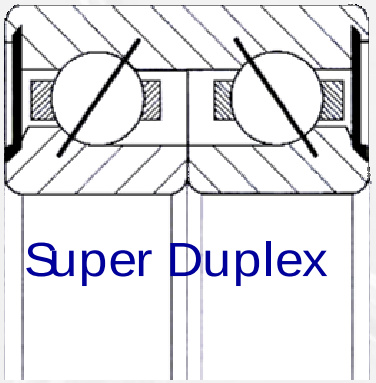
Tandem, DT
T-Type

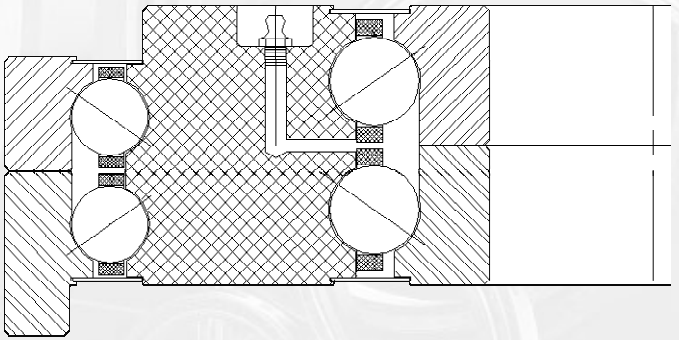


- High one-direction thrust loads
- Minimum axial shaft deflection
- Heavy radial loads

Special Performance and Design Options

- Large Variety of Materials
- Thin Dense Chrome plating
- Special lubricants & coatings
- Integral gears & flanges
- Integral shields
- Special seal materials and designs for all cross sections
- Metric sizes and extra thin cross sections available
- Duplex Pairs
- RBC SuperDuplex
  - Simplified mounting & assembly
  - Improved preload control
  - Greater overall system stiffness

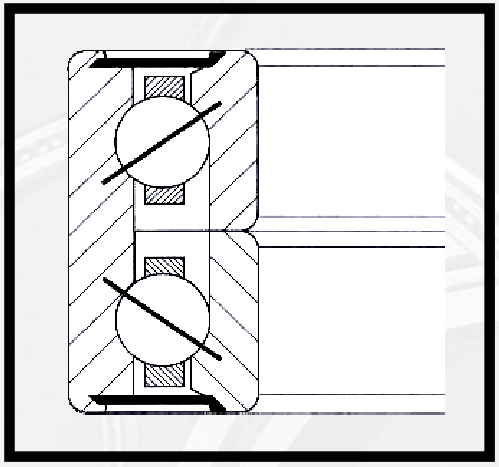




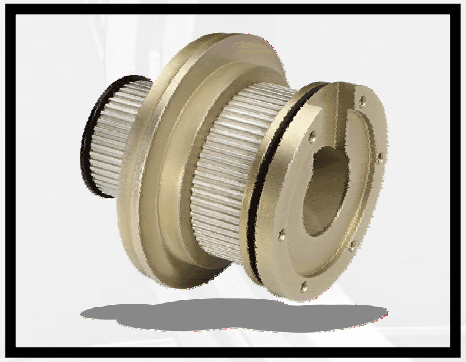
RBC Design and Applications Support

- Custom designs are our specialty
  - "Problem Solvers"
- Full applications engineering support
  - Engineering staff in CT and CA
  - Extensive analytical capabilities and software
- Comprehensive inspection and metallurgical capabilities
- Bearing refurbishment & certified FAA Repair Station

RBC Custom Designs



SuperDuplex



Integrated Assembly

- RBC SuperDuplex
  - Simplified mounting & assembly
  - Improved preload control
  - Greater overall system stiffness
- Integrated assemblies
  - For robotic arm assemblies
  - Improved stiffness and accuracy
  - Parts management solution

Thin Section Bearing Applications

Integral Shields

Shields are machined integral to the bearing outer ring to provide superior shielding. In addition, they provide enhanced free-state bearing stiffness.

440c Ring Material

Eliminates TDC plating while providing corrosion resistance. TDC coatings can alter or degrade precision, tolerances, and finish.

Low Torque / High Stiffness

These design characteristics result in an optimized bearing solution for demanding low torque, high stiffness applications.

RBC BEARINGS

Thin Section Bearing Applications

440c Spacer Balls

Spacer balls are smaller than load balls by 0.5-1%. In preloaded bearings, other separator options may generate particle shedding – resulting in erratic torque fluctuations.

Silicon Nitride Load Balls

Si_3N_4 balls have a much lower coefficient of friction versus steel balls. They provide enhanced survivability under marginal lubrication. Si_3N_4 balls also have a modus of elasticity 50% higher than steel balls to provide higher stiffness.

Product Support Materials

- Catalog
  - Printed
  - CD-ROM
- Website
  - PDF catalog downloadable
  - Bearing selection guide & locator

RBC Thin Section Ball Bearings