

McGILL[®]

Cam Follower Bearings



A Regal Brand

REGAL

A Century of Innovation



In 1905 James H. McGill founded what is today McGill Manufacturing Company, a key part of Regal Power Transmission Solutions. McGill developed a variety of products, including bearings in the 1920s. Since then, McGill bearings have continued to evolve to meet the needs of an ever-expanding list of industries and applications. McGill now has 100 years experience in design and manufacturing, with a long line of “firsts”:

A Future in Improving Productivity

System uptime and operational efficiencies are key to profitable manufacturing in the twenty-first century and McGill precision bearings play an important role.

Premature bearing failure can dramatically drive up operating costs and increase system maintenance requirements. That’s why McGill engineers design bearings to meet a host of different needs – easing installation, reducing maintenance and decreasing equipment downtime.

As our customer base has expanded, McGill has continued to design unique bearing solutions beyond our standard offerings. By applying years of engineering and manufacturing expertise, our staff of bearing specialists has created a broad array of bearing solutions to meet some of the toughest application requirements.

As we celebrate 100 years of manufacturing excellence, McGill looks forward to the next century of working with you to help select and design better, more efficient bearing solutions to reduce costs and positively impact your bottom line.



- MULTI-ROL
1930-needle bearings
- CAMROL®
1937-cam follower bearings
- GUIDEROL®
1956-needle bearings
- NYLAPLATE®
1964-seal
- SPHERE-ROL®
1967-spherical roller bearings
- LAMBDA®
1973-seal
- LUBRI-DISC®
1974-seal
- LUBRI-DISC+
1992-seal
- Metric CAMROL®
1993-liquid metal retention
- Special-Duty CAMROL®
1998-cam follower bearings
- Heavy-Duty CAMROL®
1999-cam follower bearings
- CRES
2000-CAMROL stainless steel

McGill Precision Bearings Reduce Operating Cost

CAMROL Cam Follower Selection Guide

Condition	How to identify	Potential Solutions
General Purpose Applications	Using an unsealed bearing and desire longer life	LUBRI-DISC Seal CF-1-S Can extended bearing life 10 times longer than an unsealed bearing
Ease of installation	feature a screwdriver slot to hold bearing during installation	Hex-Hole CF-1-S-B Provides superior holding power
Blind Hole Applications	Stud type cam follower installed into drilled and tapped hole	
Misalignment/Corner Loading	Wear pattern on roller diameter offset from center	Crowned OD CCF-1-S Helps to center load
Thrust	<ul style="list-style-type: none"> • Thrust loads present • Bearing supports rotating table • Bearing roller develops excessive end play 	Heavy Duty CFD-3 Incidental thrust loads
		TRAKROL PCF-3 Higher thrust loads
Corrosion	<ul style="list-style-type: none"> • Visible rust • Washdown environment • Bearing lock-up 	CRES CAMROL® CF-1-SB-CR Corrosion resistant 440C material
Contamination	<ul style="list-style-type: none"> • Dusty or contaminated environment • Bearing lock-up 	Increased sealing protection:
		LUBRI-DISC Seal CF-1-S
		Heavy Duty CFD-3
		Special Duty SD-CF-1
Maintenance Free	<ul style="list-style-type: none"> • Bearing difficult to reach • Relubrication not desired 	Maintenance free options:
		Bushing Type BCF-1-S
		Heavy Duty CFD-3
		Special Duty SD-CF-1
		TRAKROL PCF-3

CAMROL® – The Industry Standard

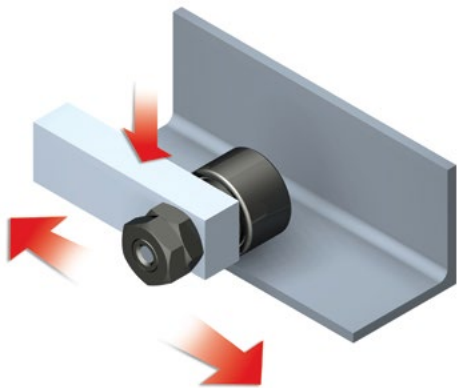
In 1937, McGill engineers invented the first needle bearing cam follower. Since that time, McGill has maintained its leading position through the continuous development of new features and improvements to the CAMROL bearing product line.

As today's leading manufacturer of quality cam follower bearings, McGill has developed many features to extend bearing life for a variety of operating conditions, lubrication requirements and application environments. McGill offers the broadest range of cam follower bearings on the market with over 1,400 standard designs to choose from.

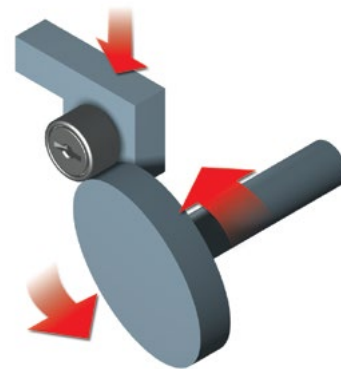
Overview

The typical functions of a cam follower are to provide anti-friction support of linear movement or to follow the surface of a cam. The CAMROL cam follower from McGill was designed to withstand the intermittent shock, loading and precision requirements associated with these applications.

Track or Load



External Cam



Industries

- Auto plants
- Food and beverage
- Forest products
- Oil drilling
- Printing
- Steel mills
- Textiles

Applications

- Automation equipment
- Machine tools
- Packaging equipment
- Unit material handling

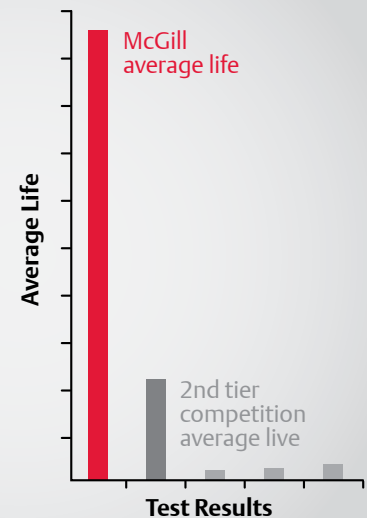
Superior Design Features Promote Longer Life, Lower Cost

Although others have tried to copy the outward appearance of CAMROL bearings, our customers find vast differences in performance. In laboratory testing, CAMROL bearings last up to 50 times longer than some competitors in a variety of laboratory and customer tests.

Proven Performance

Eight bearings from each manufacturer were tested under identical laboratory conditions without relubrication.

CF-1-S size tested at 200 lbs and 1,500 RPM.

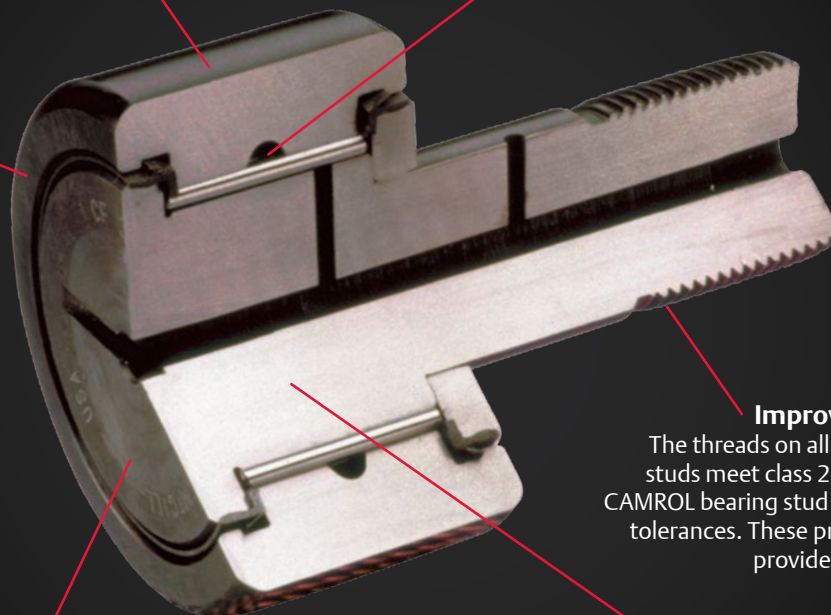


Heavy Sectioned Outer Race

The heavy sectioned outer race helps withstand shock loading of cam follower operation.

Black Oxide Finish

CAMROL bearings have a black oxide finish on all external surfaces to help inhibit corrosion.



Lubrication Groove Extends Bearing Life

All inch dimension CAMROL bearings with seals have a lubrication groove that extends lubrication intervals and increases the prelubricated life of the bearing.

Improved Holding Power

The threads on all inch CAMROL bearing studs meet class 2 tolerances and metric CAMROL bearing stud threads meet class 6G tolerances. These precise geometrics help provide better holding power.

High Quality Materials

Although other steels may be less expensive, McGill only uses high quality, specialty steel to boost the performance and endurance that is the hallmark of a CAMROL bearing.

Specialized Heat Treatment

All raceways are heat treated to a minimum of 58 HRC. Inner studs are induction heat treated to McGill specifications to provide a hardened raceway and a ductile stem that provides toughness for absorbing the shocks of cam follower operations.

Metric Cam Follower Bearings

McGill offers Metric CAMROL® bearings in metric dimensions equivalent to ISO standard series. Both European and Asian versions are available.

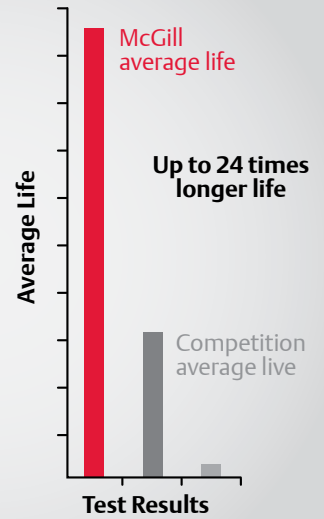
Metric CAMROL bearings are available in stud or yoke type versions. Specifying the type of bearing needed depends upon the preference for either a straddle (yoke) mounting or a cantilever (overhung) mounting.

Metric CAMROL bearings are available with three types of internal construction: full complement needle rollers, retainer type needle rollers or cylindrical rollers.

With a proven track record on inch cam followers, McGill brings many key

Proven Performance

Eight bearings from each manufacturer were tested under identical laboratory conditions without relubrication. MCF-26-S size tested at 160 lbs and 1,975 RPM.



features and manufacturing practices to the metric CAMROL series that outlast the competition. In test laboratories, McGill CAMROL bearings last up to 24 times longer than some competitors.

LUBRI-DISC Seal

Unique design reduces internal bearing friction so bearings wear less and last longer.

Jam Nut Design

Jam nuts included to help provide method for locking cam follower into place.

Grease Fitting

Fitting included to provide easy relubrication with standard, hydraulic grease gun.

Black Oxide Finish

CAMROL bearings have a black oxide finish on all external surfaces to help inhibit corrosion.

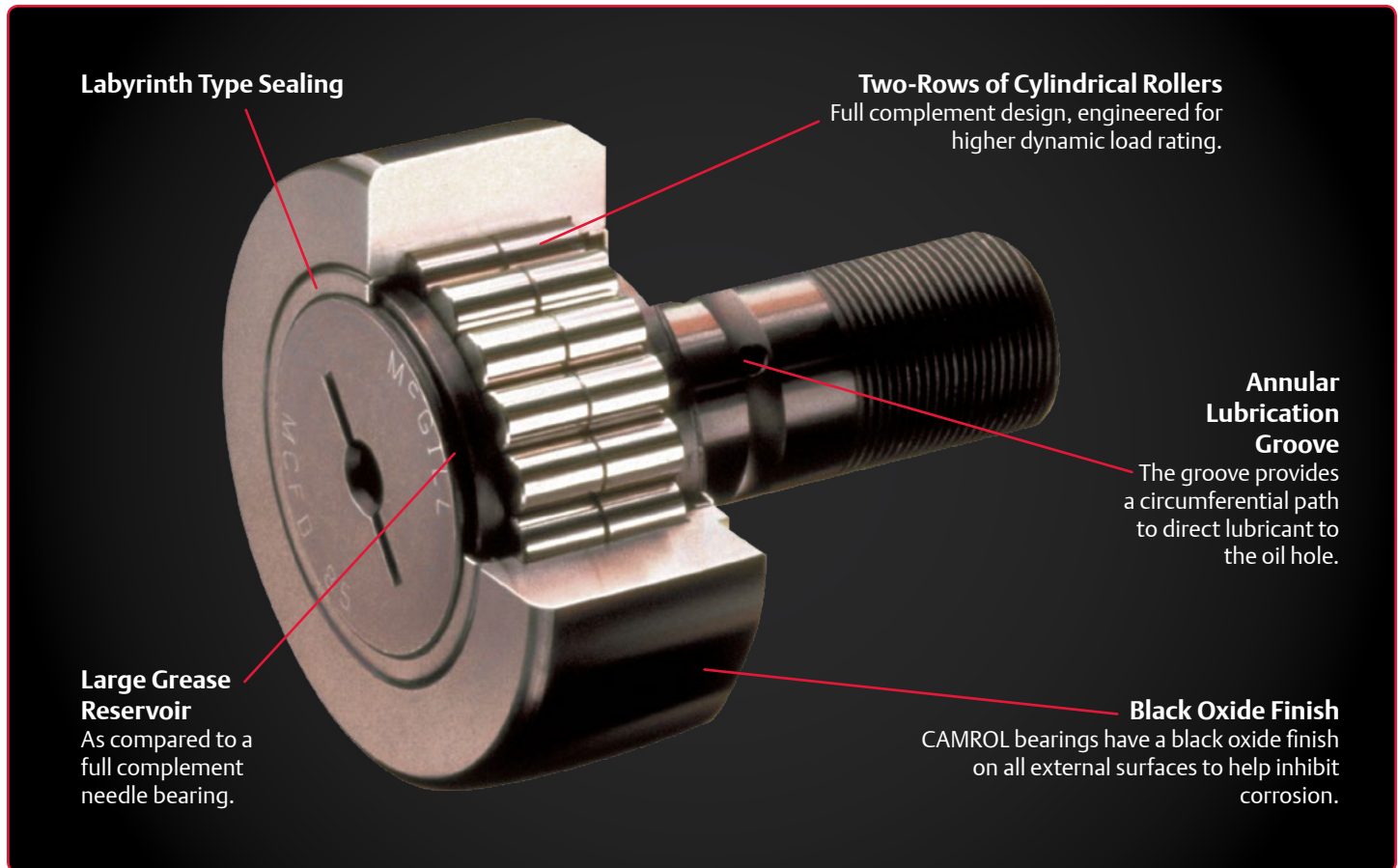
Easy to Upgrade

McGill bearings are interchangeable with European and Asian brand metric cam followers. Visit www.RegalPTS.com for interchange assistance.

Heavy-Duty Metric CAMROL

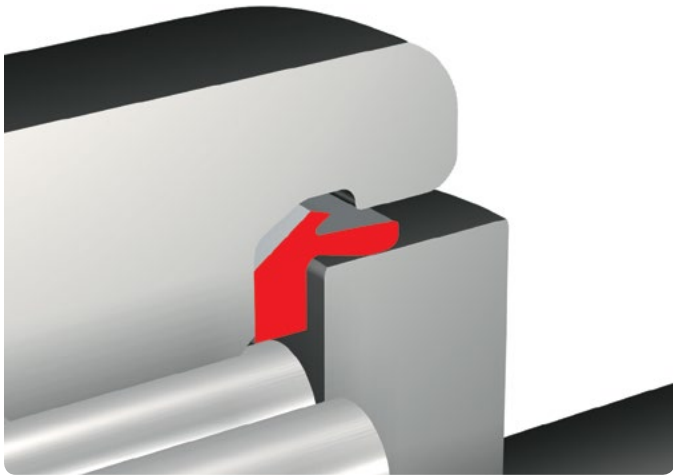
This series provides greater dynamic load ratings by using cylindrical rollers in place of standard needle rollers. This construction allows the bearings to support radial loading, as well as some axial loading.

MCFD Series



MCYRD Series

Yoke type Heavy-Duty Metric CAMROL bearings are designed for yoke (straddle) mounting on a shaft.



Note: The LUBRI-DISC seal is rated up to 250°F maximum.

LUBRI-DISC® Seal Option

The LUBRI-DISC seal option increases bearing life up to 10 times longer than unsealed bearings:

- Labyrinth and contact sealing help protect against loss of lubrication and help prevent entrance of contaminants while providing low drag operation.
- Vents help prevent seal blow-out during relubrication.
- Integral backplate design reduces internal friction by eliminating metal-on-metal contact. Less friction lowers the operating temperature, which extends grease life and allows for higher operating speeds.

Hex Hole Option for Ease of Installation

The hex hole option reduces costs by speeding installation or removal of stud type cam followers. During typical installation or removal, the bearing must be held in place while torque is applied to the mounting nuts. The optional hex hole increases secure holding power over the standard screwdriver slot in the face of the bearing. The hex hole option is standard for stud type Heavy-Duty, Special-Duty and Corrosion-Resistant (CRES) CAMROL® bearings and is an option for standard CAMROL bearings.

The hex hole option is ideal for:

- Difficult to reach assemblies
- Blind hole mounting
- Equipment with many bearings

Note: The hex hole option does not allow for relubrication from the roller end of the bearing on most sizes. (All metric versions and inch sizes below 3" OD.)

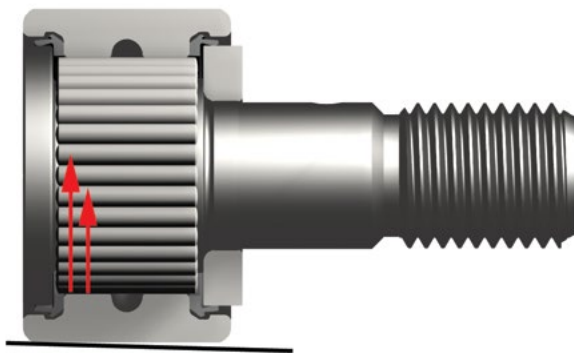


Crowned OD Option for Long Life

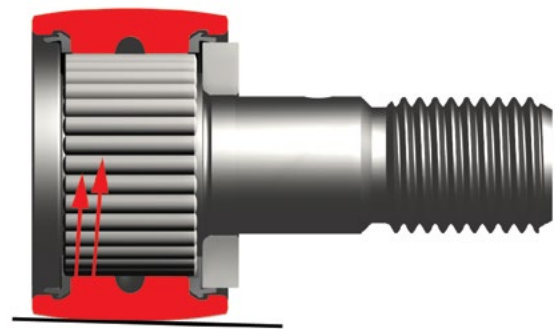
A slight crown on the OD of a cam follower bearing can increase bearing life up to three times longer than the standard, cylindrical OD bearing. The crown helps more evenly distribute stresses for the following conditions:

- Heavy loading
- Misalignment of track or housing
- Turntable or rotary cams

Note: The crowned O.D. is an option for standard CAMROL and Heavy-Duty CAMROL bearings.



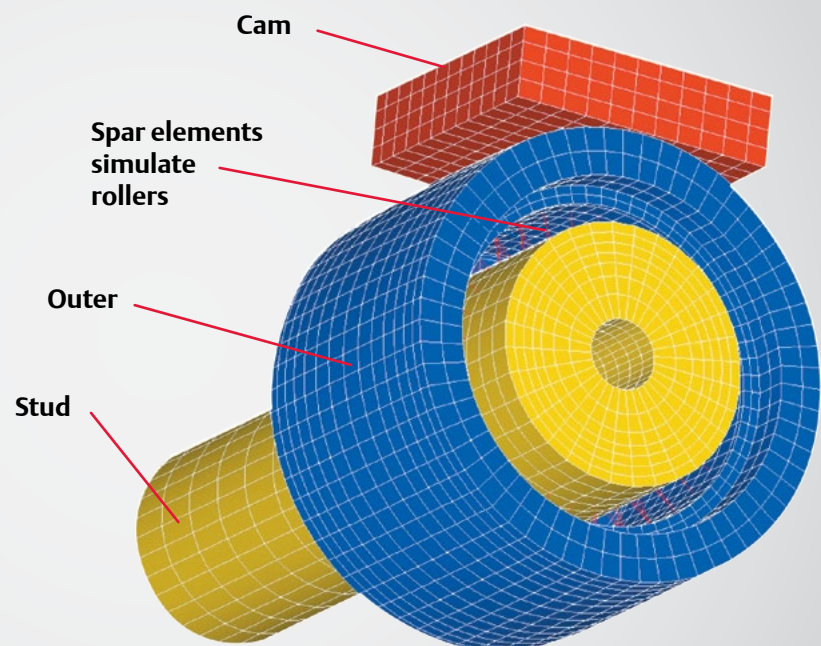
Cylindrical OD:
Misalignment can cause corner loading



Crowned OD:
Corner loading is reduced.

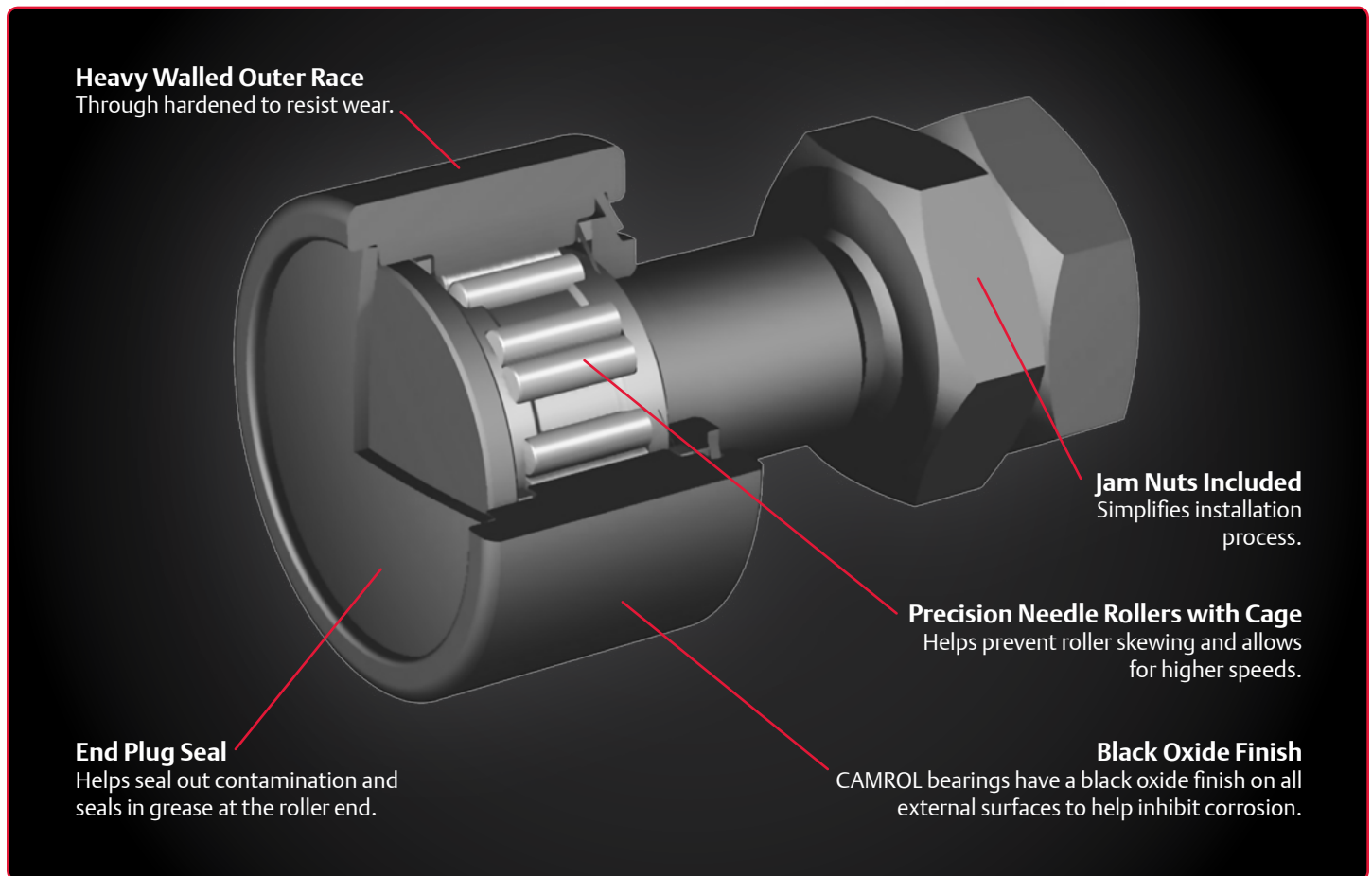
Computer analysis shows crowned OD can increase life three times longer.

Finite element analysis of cam followers under heavy loads shows crowned OD increases L10 life. More detailed results available in Motion System Design magazine, August 2003.



Special-Duty CAMROL® for Tough Environments

Select Special-Duty CAMROL bearings for tough applications such as automotive production, metal forming assembly and welding environments.



Resists Contamination

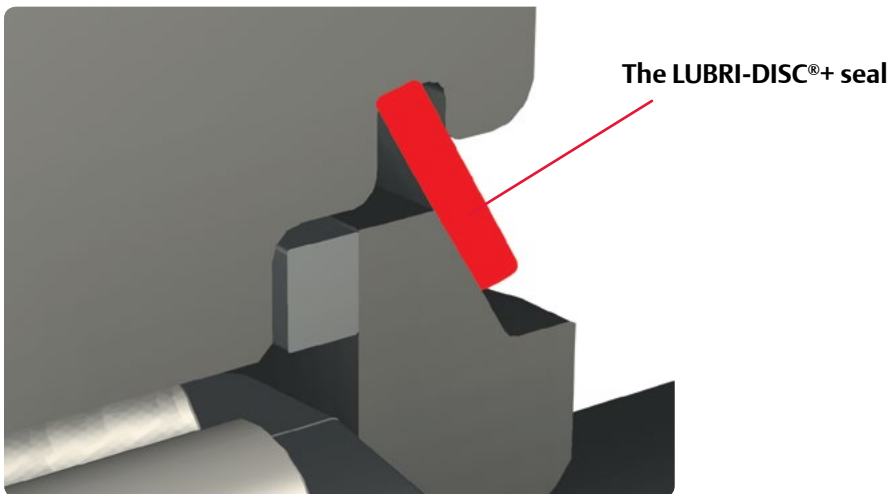
Special-Duty CAMROL bearings are specifically designed to resist contaminated environments. A metal end plug seal on the roller face helps block out contamination and resists welding spatter.

Maintenance Free

Special-Duty CAMROL bearings extend bearing life up to six times without lubrication maintenance by using synthetic grease and caged needle rollers. Caged needle rollers allow for a larger grease reservoir than standard needle bearing cam followers, a beneficial feature when relubrication is not possible.

Improved Protection

On the stud side of the Special-Duty CAMROL bearing, the LUBRI-DISC[®]+ seal offers improved protection over standard sealing.



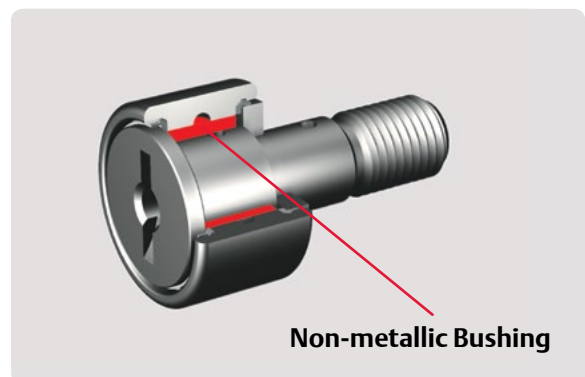
BUSHING TYPE CAMROL Cam Follower Bearings

Eliminates Relubrication

This bearing series eliminates the need for lubrication by utilizing a non-metallic bushing instead of needle rollers. Save relubrication time and inconvenience. This is ideal when relubrication is not desired and grease contamination must be avoided.

The bushing type is appropriate for:

- Light loads and slow speeds
- Not for food applications



Heavy-Duty CAMROL® for Incidental Thrust Applications

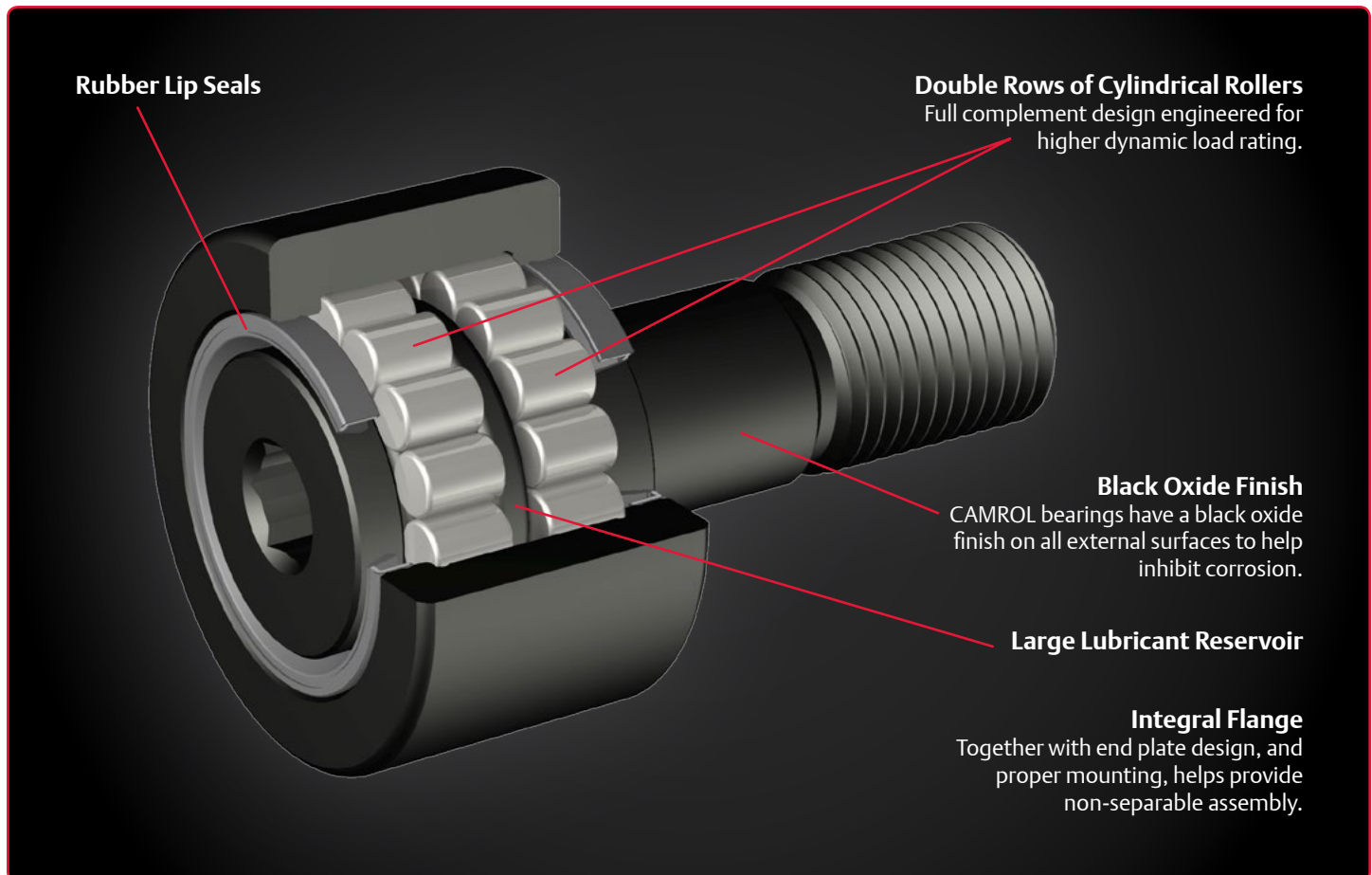
While standard needle bearing cam followers are the economical choice for most applications, incidental thrust loads make Heavy-Duty CAMROL bearings a better choice. Primary causes of incidental thrust are misalignment of housing or track, high loading causing stud deflection and rotary tracks or cams. Heavy-Duty CAMROL bearings employ a unique internal construction, consisting of two rows of cylindrical rollers designed to manage much of the thrust.

Resists Contamination

Rubber lip seals are standard in Heavy-Duty CAMROL bearings. Although standard cam followers do well in most conditions, the rubber lip seals in Heavy-Duty CAMROL bearings increase protection against contamination.

Maintenance Free

Standard bearing has no relubrication feature. Seals are pointed inward for improved grease retention. The large lubricant reservoir and rubber lip seals keep more grease in the bearing for maintenance free operation.



CRES CAMROL Cam Follower Bearings

Corrosion-Resistant
CAMROL for Food and
Beverage Applications

Greater Corrosion Resistance

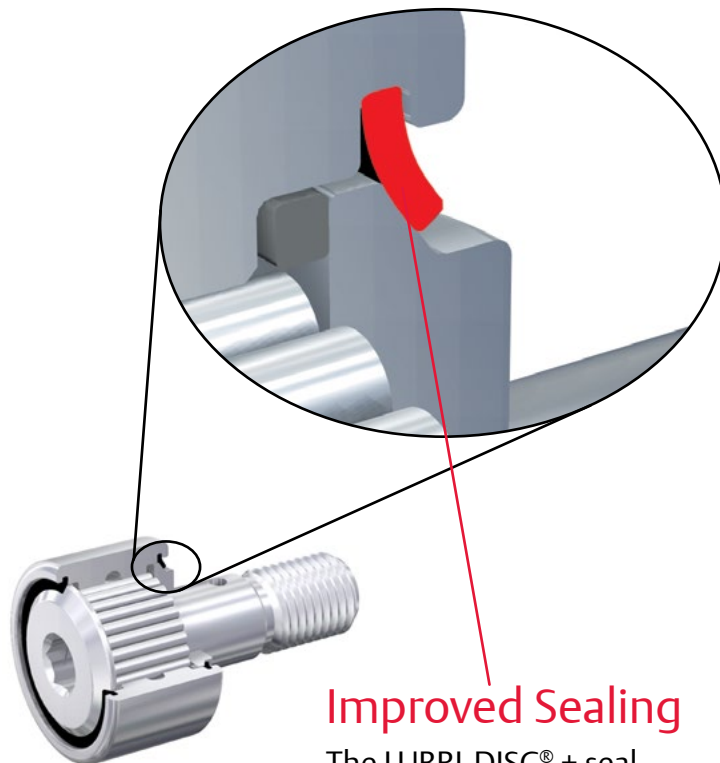
Whether equipment is exposed to the elements or to extreme washdown in food and beverage applications, the corrosion-resistant (CRES) CAMROL bearing series extends bearing life in wet or corrosive environments. The CRES CAMROL features 400 series stainless steel to help prevent corrosion.

FDA Compliant Grease

CRES CAMROL bearings utilize H1 FDA compliant grease for food applications.



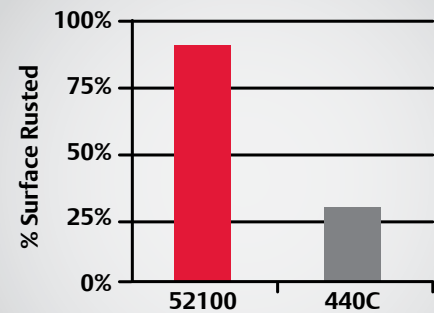
Standard cam followers rust quickly.



Improved Sealing

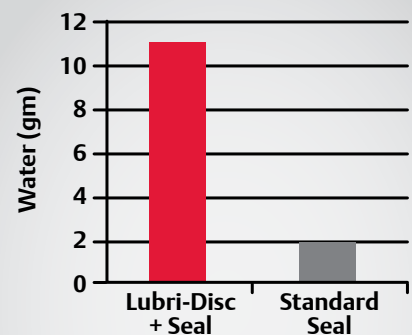
The LUBRI-DISC® + seal provides up to five times better protection against washdown than standard seals. This seal is featured in CRES CAMROL bearings 1" OD and larger.

Rust Comparison



Tested per ASTM B117 salt fog test, 5% saline solution, 100°F, 100% humidity.

Water Spray Comparison

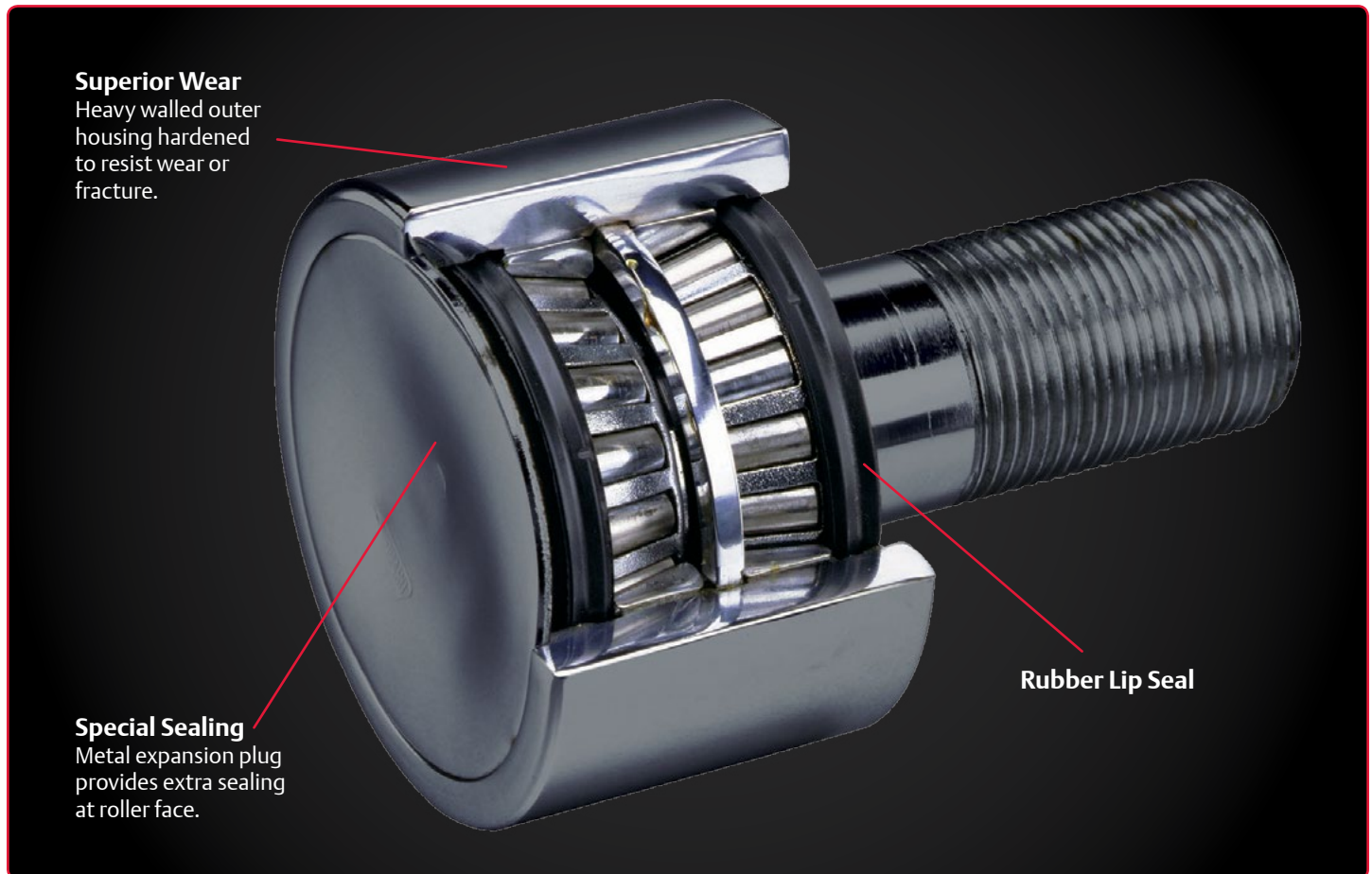


In a test originally performed to meet exacting aerospace standards, CRES CAMROL bearings were tested with a high pressure spray aimed at the bearing face. This graph shows how each seal held-up – the LUBRI-DISC + seal featured in CRES CAMROL bearings was the obvious winner.

TRAKROL® Cam Follower Bearings

For Thrust and Contamination

TRAKROL bearings feature a different design than CAMROL® bearings to allow for heavier thrust loads. Smaller sizes (< 3" OD or point diameter) use ball bearing inserts and larger sizes use tapered roller bearings to accept thrust loads.



Resists Contamination

Rubber lip seals help keep out contamination on the stud side of the bearing and a metal end plug helps protect the roller face.

Thrust Applications

Tapered roller bearing or ball bearing inserts allow for the heavier thrust capabilities of the TRAKROL bearing.

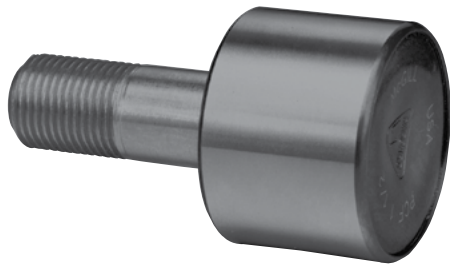
Maintenance Free

A large grease reservoir allows for longer life without relubrication.

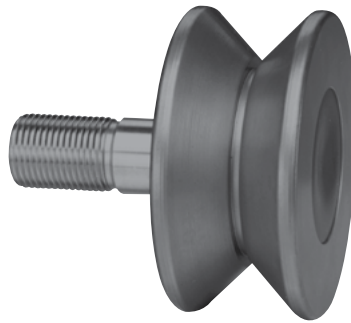
Wide Selection

- Three OD types (plain, flanged and V-groove)
- Stud and yoke types
- Eccentric stud option available

Note: TRAKROL bearings are not always dimensionally interchangeable with CAMROL.



PCF Series



VCF Series



FCF Series

Yoke TRAKROL Bearings

Yoke TRAKROL bearings are designed for yoke (straddle) mounting on a shaft and utilize tapered roller bearings.

Available in three configurations.

VCYR Series



FCYR Series



PCYR Series



For part nomenclature, see page 19.

A History of Innovation... a Future in Helping You Stay Competitive

Precision Manufacturing

Because there are no industry-wide standards for tolerances on cam follower bearings, McGill has set its own demanding tolerances for CAMROL® bearings. McGill uses statistical process control to help provide cam followers that are manufactured according to these exacting standards.

McGill was one of the first bearing manufacturers to receive ISO 9001 certification. ISO certification and the process it encompasses help McGill design and manufacture bearings to uniform quality standards. While others have tried to imitate the McGill design, only McGill has the precision, quality and performance that leads the industry.

Advanced Tools

McGill engineers use a wide variety of tools, such as computer analysis and sophisticated laboratory testing, to anticipate and design new solutions.

As applications push the limits of bearing performance, McGill engineers analyze and help prevent problems through failure analysis. Physical analysis, including scanning electron microscopy and internal and third party testing facilities, are available to help understand and diagnose problems, leading to cost effective solutions.



Engineering Excellence

Leveraging experience gained from developing high performance aerospace and industrial applications, McGill routinely designs and manufactures bearings up to Class 5 precision levels with exotic materials or coatings.

As developers of the first cam follower bearing, McGill's engineering team leads the industry in cam follower design. Extreme operating environments, changing size requirements, high temperature differentials, and caustic chemicals – McGill engineers respond with a complete selection of standard offerings and customized bearing solutions for your application challenges.



Professional Timely Service

McGill is known for a commitment to customer service:

- Inventories optimized to achieve excellent service fill rates
- Standard box, bulk and special packaging available to meet your needs
- Trained personnel to help solve problems quickly and accurately
- A comprehensive distribution network and a focus on quick delivery, enabling us to serve you efficiently
- A technical customer service group for technical issues and a general customer service group for all other concerns so you always have the right resources to help you resolve issues

McGill Needle Bearings

McGill machined race needle bearings are manufactured from bearing quality steel and available with multiple seal configurations. McGill needle bearings have a lubrication groove with radial holes on both the inner and outer rings for relubrication through the housing or shaft. Custom designs, lubricants and diametrical matching (-DS Suffix) are available.



MR 32 Shown

CAGEROL®

Bearings are available in two series.

Standard width MR 5/8" to 9 1/4" bore sizes

Narrow width MR-N 5/8" to 6 1/2" bore sizes

- Steel cage construction allowing for higher-speed operation, while providing roller guidance and a lubricant reservoir.
- Crowned rollers, available on most sizes, reduce end stresses.
- Available with optional inner ring (MI) which provides a hardened raceway for the rollers when used with an unhardened shaft.

GUIDEROL®

Bearings are available in two series.

Standard width GR sizes 5/8" to 9 1/4" bore sizes

Narrow width GR-N sizes 5/8" to 6 1/2" bore sizes

- Full complement needle bearing allowing for higher static load rating, rigidity, and shock resistance.
- Available with optional inner ring (MI) which provides a hardened raceway for the rollers when used with an unhardened shaft.



GR 32 SS with Inner Ring Shown

McGill Spherical Roller Bearings

McGill Spherical Bearings single row of spherical rollers provides a wide variety of advantages. The bearing design allows for higher capacities, higher-limiting speeds, longer life under more misalignment and protection from contaminant within the same envelope of ordinary two-row designs.



SB-22207-W33-SS Shown

SPHERE-ROL®

Bearings are available in two series (tapered bore optional):

22200 series - 20mm to 150mm bore sizes

22300 series - 40mm to 100mm bore sizes

- Sealed SPHERE-ROL bearing dimensions meet ABMA/ISO specifications. Choose from three seal types:
 - NYLAPLATE® seal
 - NYLAPLATE® high temperature seal
 - LAMBDA® seal
- Dimensionally interchangeable with conventional double row spherical roller bearings.
- Spherical rollers increase dynamic load capacity and misalignment of conventional double row spherical roller bearings.

Cam Follower Nomenclature Chart

Series	Type	Internal Construction	Size Specification	Seal	Mounting Method	O.D. Configuration		
Camrol Bearings								
CF	Standard Stud	Full Complement Needle Rollers	Roller Diameter in Inches	Unsealed	Screwdriver Slot	Cylindrical		
CF-S				Lubri-Disc		Crowned		
CCF-S				Eccentric Stud	Unsealed	Hex Hole	Cylindrical	
CF-B					Lubri-Disc		Crowned	
CF-SB					Unsealed		Cylindrical	
CCF-SB					Lubri-Disc	Crowned		
CFE-B	Heavy Stud				Unsealed	Screwdriver Slot	Cylindrical	
CFE-SB					Lubri-Disc		Crowned	
CCFE-SB				Yoke	Unsealed	Hex Hole	Cylindrical	
CFH	Lubri-Disc				Crowned			
CFH-S	Yoke				Unsealed		Yoke	Cylindrical
CCFH-S				Lubri-Disc	Crowned			
CCFH-SB				Lubri-Disc	Crowned			
CYR	Yoke			Unsealed	Yoke	Cylindrical		
CYR-S				Lubri-Disc		Crowned		
CCYR-S				Lubri-Disc		Crowned		
Bushing Camrol Bearings								
BCF-S	Standard Stud			Bushing	Roller Diameter in Inches	Lubri-Disc	Screwdriver Slot	Cylindrical
BCF-SB		Hex Hole	Crowned					
BCCF-SB		Yoke	Cylindrical					
BCYR-S	Yoke							
CRES Camrol Bearings								
CF-SB CR	Standard Stud	Full Complement Needle Rollers	Roller Diameter in Inches	Lubri-Disc or Lubri-Disc +	Hex Hole	Cylindrical		
CFE-SB CR	Eccentric Stud							
CYR-S CR	Yoke							
Heavy-Duty Camrol Bearings								
CFD	Standard Stud	Double Row Cylindrical Rollers	Roller Diameter in Inches	Rubber Lip	Hex Hole	Cylindrical		
CCFD						Crowned		
CYRD	Yoke				Yoke	Cylindrical		
CCYRD					Crowned			
Special-Duty Camrol Bearings								
SDCF	Standard Stud	Caged Needle Rollers	Roller Diameter in Inches	End Plug and Lubri-Disc +	Hex Hole	Cylindrical		
Metric Camrol Bearings								
MCF	Standard Stud	Full Complement Needle Rollers	Roller Diameter in Millimeters	Unsealed	Screwdriver Slot	Crowned		
MCF-S				Lubri-Disc		Cylindrical		
MCF-SX				Caged Needle Rollers		Unsealed	Crowned	
MCFR						Lubri-Disc	Cylindrical	
MCFR-S						Full Complement Needle Rollers	Lubri-Disc	Crowned
MCFR-SX								Cylindrical
MCF-SB		Crowned						
MCF-SBX		Caged Needle Rollers			Lubri-Disc	Cylindrical		
MCFR-SB				Crowned				
MCFR-SBX				Cylindrical				
MCFE-SB		Eccentric Stud		Full Complement Needle Rollers	Bore Diameter in Millimeters	Yoke	Crowned	
MCFRE-SB				Caged Needle Rollers				
MCYR	Yoke	Full Complement Needle Rollers	Unsealed	Yoke	Crowned			
MCYR-S			Lubri-Disc		Cylindrical			
MCYR-SX			Caged Needle Rollers		Unsealed	Crowned		
MCYRR		Lubri-Disc		Cylindrical				
MCYRR-S		Crowned						
MCYRR-SX		Cylindrical						
Metric Heavy-Duty Camrol Bearings								
MCFD	Standard Stud	Double Row Cylindrical Rollers	Roller Diameter in Millimeters	Metal Shield	Screwdriver Slot	Crowned		
MCFD-X						Cylindrical		
MCYRD	Yoke		Bore Diameter in Millimeters		Yoke	Crowned		
MCYRD-X						Cylindrical		
Metric Special-Duty Camrol Bearings								
SDMCF	Standard Stud	Caged Needle Rollers	Roller Diameter in Millimeters	End Plug and Lubri-Disc +	Hex Hole	Cylindrical		
Trakrol Bearings								
PCF	Standard Stud	Ball or Tapered Roller Bearings	Roller Diameter in Inches	Rubber Lip and End Plug	Hex Hole	Cylindrical		
PCFE	Eccentric Stud					Point Diameter in Inches	Flanged	
FCF	Standard Stud						V-Groove	
FCFE	Eccentric Stud		Yoke		Rubber Lip	Cylindrical		
VCF	Standard Stud					Flanged		
VCFE	Eccentric Stud	Point Diameter in Inches	V-Groove					
PCYR	Yoke	Tapered Roller Bearings	Roller Diameter in Inches	Rubber Lip	Yoke	Cylindrical		
FCYR			Point Diameter in Inches			Flanged		
VCYR			Point Diameter in Inches			V-Groove		



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APPLICATION CONSIDERATIONS

The proper selection and application of power transmission products and components, including the related area of product safety, is the responsibility of the customer. Operating and performance requirements and potential associated issues will vary appreciably depending upon the use and application of such products and components. The scope of the technical and application information included in this publication is necessarily limited. Unusual operating environments and conditions, lubrication requirements, loading supports, and other factors can materially affect the application and operating results of the products and components and the customer should carefully review its requirements. Any technical advice or review furnished by Regal Beloit America, Inc. and its affiliates with respect to the use of products and components is given in good faith and without charge, and Regal assumes no obligation or liability for the advice given, or results obtained, all such advice and review being given and accepted at customer's risk.

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