CAM FOLLOWER BEARINGS
A Century Of Innovation

The McGill brand of bearings was established in 1905 by James H. McGill and is a key part of Regal. Since then, McGill bearing products have continued to evolve to meet the needs of an ever expanding list of industries and applications. Regal now has 100 years of 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 bearing engineers design bearings to meet a host of different needs – easing installation, reducing maintenance and decreasing equipment downtime.

As our customer base has expanded, we have 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, Regal 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.

McGill® precision bearings reduce operating cost

CAMROL® cam follower bearing selection guide

<table>
<thead>
<tr>
<th>Condition</th>
<th>How to identify</th>
<th>Potential solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Difficult</td>
<td>Standard stud type cam followers feature a screwdriver slot to hold bearing during installation which is sometimes not sufficient</td>
<td>Hex Hole CF-1-S Provides superior holding power</td>
</tr>
<tr>
<td>Stud Hole Applications</td>
<td>Stud type cam follower installed into drilled and tapped hole</td>
<td>Crowfoot OD EC4-55 Helps to center load</td>
</tr>
<tr>
<td>Misalignment/ Corner Loading</td>
<td>Wear pattern on roller diameter offset from center</td>
<td>Heavy Duty CF-3.3 Incidental thrust loads</td>
</tr>
<tr>
<td>Thrust</td>
<td>• Thrust loads present • Bearing supports rotating table • Bearing roller develops excessive end play</td>
<td>TRAKROL® Bearing FR-3 Higher thrust loads</td>
</tr>
<tr>
<td>Load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td>Difficult</td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>Installation</td>
<td></td>
</tr>
<tr>
<td>Blind Hole Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misalignment/ Corner Loading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contamination</td>
<td>• Visible rust • Washdown environment • Bearing lock-up</td>
<td>CRES® CAMROL Bearing CF-1.5B-CH Corrosion resistant 440C material</td>
</tr>
<tr>
<td>Contamination</td>
<td>• Dusty or contaminated environment • Bearing lock-up</td>
<td>Reduced Maintenance:</td>
</tr>
<tr>
<td>Bushing Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Duty CF-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Duty CB-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRAKROL Bearing FR-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1930 - MULTIROL™ cam follower bearings
1937 - CAMROL® cam follower bearings
1956 - GUIDEROL® needle bearings
1964 - NYLAPLATE® seal
1967 - SPHERE-ROL® spherical roller bearings
1973 - LAMBDA® seal
1974 - LUBRI-DISC™ seal
1980 - TRAKROL® cam follower bearings
1992 - LUBRI-DISC™+ seal
1993 - Metric CAMROL liquid metal injection seal bearings
1998 - Special-Duty CAMROL cam follower bearings
1999 - Heavy-Duty CAMROL cam follower bearings
2000 - CRES™ CAMROL stainless steel bearings
CAMROL® Bearing — The Industry Standard

Since 1937, the McGill brand 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, Regal has developed many features to extend bearing life for a variety of operating conditions, lubrication requirements and application environments. The McGill brand offers a broad range of cam follower bearings 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 bearing from Regal was designed to withstand the intermittent shock, loading and precision requirements associated with these applications.

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 at Regal, CAMROL bearings last up to 50 times longer than some competitors’ products in a variety of laboratory and customer tests.

Test Results

- McGill® bearings average life
- 2nd tier competition average life

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

Overview

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.

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

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.

Specialized heat treatment
All raceways are heat treated to a minimum of 58 HRC. Inner studs are induction heat treated to McGill bearing 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**

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

**Proven Performance**

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

**Heavy Duty Metric CAMROL® Bearings**

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 Bearings**

- **Two-rows of cylindrical rollers**
  - Full complement design, engineered for higher dynamic load rating.

- **Annular lubrication groove**
  - The groove provides a circumferential path to direct lubricant to the oil hole.

- **Large grease reservoir**
  - As compared to a full complement needle bearing.

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

**MCYRD® Series Bearings**

Yoke type heavy-duty metric CAMROL bearings are designed for yoke (straddle) mounting on a shaft.

**Test Results**

<table>
<thead>
<tr>
<th>Average Life</th>
<th>McGill bearings average life</th>
<th>Up to 24 times longer life</th>
<th>Competition average life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Results</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LUBRI-DISC™ bearing 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.

**Easy to upgrade**

McGill bearings are interchangeable with European and Asian brand metric cam followers. Visit regalbeloit.com/Brands/McGill for interchange assistance.

**Black oxide finish**

CAMROL bearings have a black oxide finish on all external surfaces to help inhibit corrosion.
LUBRI-DISC™ Bearing 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 CREST™ corrosion resistant 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.

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® Bearings For Tough Environments

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

Resist 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™+ bearing seal offers improved protection over standard sealing.

BUSHING TYPE CAMROL BEARINGS

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® Bearings
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.

Resist 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 Bearings 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 CRES corrosion resistant CAMROL bearing extends bearing life in wet or corrosive environments compared to standard cam followers. The CRES CAMROL bearing features 400 series stainless steel to help prevent corrosion.

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

For part nomenclature, see page 19.

Rust Comparison

<table>
<thead>
<tr>
<th>% Surface Rusted</th>
<th>52100</th>
<th>440C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>100%</td>
<td>50%</td>
</tr>
<tr>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>50%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>75%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

Water Spray Comparison

<table>
<thead>
<tr>
<th>Water (gm)</th>
<th>LUBRI-DISC® Seal</th>
<th>Standard Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

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 + bearing seal featured in CRES CAMROL bearings 1” OD and larger 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.

- **Superior wear**
  - Heavy-walled outer housing hardened to resist wear or fracture.
- **Special sealing**
  - Metal expansion plug provides extra sealing at roller face.
- **Rubber lip seal**

**Resists Contamination**

Rubber lip seals help keep out contamination on the stud side of the bearing and a metal end plug seal 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® bearings.

**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® bearings.

**Yoke TRAKROL Bearings**

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

**Available in three configurations.**

- **PCF Series**
- **VCF Series**
- **FCF Series**
- **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, Regal has set its own demanding tolerances for McGill CAMROL bearings. Regal uses statistical process control to help provide cam followers that are manufactured according to these exacting standards.

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

Advanced Tools
Regal 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, Regal 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. Regal routinely designs and manufactures McGill® bearings up to Class 5 precision levels with exotic materials or coatings.

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

Professional Timely Service
Regal 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.

CAGEROL® Bearing

Bearings are available in two series. Standard width MR 5/8” to 9 ¼” bore sizes. Narrow width MR-N 5/8” to 6 ½” 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® Bearing

Bearings are available in two series. Standard width GR sizes 5/8” to 9 ¼” bore sizes. Narrow width MR-N sizes 5/8” to 6 ½” 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.

McGill Spherical Roller Bearings

The McGill spherical bearing’s 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 contaminant within the same envelope of ordinary two-row designs.

SPHERE-ROL® Bearing

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

<table>
<thead>
<tr>
<th>Series</th>
<th>Type</th>
<th>Internal Construction</th>
<th>Size specification</th>
<th>Seal</th>
<th>Mounting method</th>
<th>O.D. Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric Camrol bearings</td>
<td>Standard stud</td>
<td>Full complement needle rollers</td>
<td>Roller diameter in millimeters</td>
<td>Lubri-Disc or Lubri-Disc +</td>
<td>Hex hole</td>
<td>Cylindrical</td>
</tr>
<tr>
<td>Metric Cam rol bearings</td>
<td>Eccentric stud</td>
<td>Full complement needle rollers</td>
<td>Roller diameter in inches</td>
<td>Lubri-Disc™</td>
<td>Hex hole</td>
<td>Cylindrical</td>
</tr>
<tr>
<td>Metric Special duty Camrol bearings</td>
<td>Standard stud</td>
<td>Full complement needle rollers</td>
<td>Roller diameter in millimeters</td>
<td>Lubri-Disc™</td>
<td>Hex hole</td>
<td>Cylindrical</td>
</tr>
<tr>
<td>Metric Special Duty Camrol bearings</td>
<td>Eccentric stud</td>
<td>Full complement needle rollers</td>
<td>Roller diameter in inches</td>
<td>Lubri-Disc™</td>
<td>Hex hole</td>
<td>Cylindrical</td>
</tr>
</tbody>
</table>
APPLICATION CONSIDERATIONS

The proper selection and application of 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/or its affiliates ("Regal") 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.

For a copy of our Standard Terms and Conditions of Sale, please visit https://www.regalbeloit.com/Terms-and-Conditions-of-Sale. These terms and conditions of sale, disclaimers and limitations of liability apply to any person who may buy, acquire or use a Regal product referred to herein, including any person who buys from a licensed distributor of these branded products.