CEROBEAR®
ceramic bearing technology

Cerobear hybrid rolling bearings for the food and beverage industries

CEROBEAR HYBRID BEARINGS

CEROBEAR GmbH is a renowned world leader in the design, manufacturing and application engineering of bearings that feature highly advanced ceramic material technology. Our **CE**ramic **RO**lling **BEAR**ings are used in the most challenging applications where standard steel rolling bearings are no longer capable of performing reliably.

In addition to serving market segments including, Aerospace, Motorsports, Fluid Machinery, Oil & Gas, Machine Tools, Semicon/Vacuum/Solar Processing, CEROBEAR also designs and manufactures advanced bearings for the Food and Beverage Packaging Machinery Industry.

With a team of more than 100 technically oriented employees and the most modern manufacturing technology, CEROBEAR rolling bearings are produced in Herzogenrath near Aachen, a small city near Cologne in the western-most part of Germany.

CEROBEAR bearings are perfectly suited to fulfill the high demands of the food and beverage industries.

The CEROBEAR Difference

Simultaneous Engineering

- Specialist for joint bearing development from prototyping to production levels
- Close customer collaboration at every development stage from the design to serial usage
- Analysis, calculation and lifetime-prediction for bearings featuring ceramic components.

Advanced Bearing Materials

- Leading expert in the use of Si_3N_4 & ZrO_2 ceramics in rolling bearings.
- High Nitrogen Steels with superior corrosion resistance at 60 HRC.
- Advanced Polymers: PEEK, Vespel, Torlon, PCTFE, PGM-HT...

Advanced Component Fabrication & Inspection

- In-house ball surface inspection yields outstanding reliability.
- In-house ceramic roller fabrication with exceptional geometry flexibility
- Hard-turning for rings maximizes roundness & concentricity; Enables complexity.

Complete Design Consideration

- We specialize in customized designs & do standard bearings as well.
- Custom fit and integration into all application requirements.
- Assure maximum benefits from materials being used
- Maximize performance and service-life.

Flexible, Quick, and Highly Certified Manufacturing

- 8-16 weeks delivery for initial non-stocked orders, depending on the complexity of the part.
- Complete traceability of every bearing and every part
- Certified according to the following international standards:
  - EN 9100 (Aerospace Standard)
  - DIN EN ISO 9001 (Industrial Standard)
  - DIN EN ISO 14001 (Environment)
  - BS OHSAS 18001 (Safety & Health)

Production Flexibility: Small Prototype Lots to Serial Production

- For even for 100% customized bearing designs we can provide small lots with MOQ=10

CEROBEAR hybrid deep groove ball bearing

Our Products

CEROBEAR's product range includes customized and standard bearings:

- **Hybrid rolling bearings**, a combination of steel rings and silicon nitride rolling elements
- **All-Ceramic rolling bearings** made of either silicon nitride or zirconia

In addition to our extensive standard bearing selection, we also customize bearing solutions for your special application needs in a close cooperation with both machine constructors and system manufacturers.

CEROBEAR rolling bearings for Food and Beverage Packaging Machinery consist primarily of

- biocompatible,
- FDA approved and
- corrosion resistant materials.

CEROBEAR ceramic ball bearings

Materials and Technology

With >15 years of close collaboration with world leading OEMs, CEROBEAR has developed a unique material specification for rolling

bearings optimized for Food & Beverage machinery operating conditions.

CEROBEAR material specification:
The core components of CEROBEAR hybrid bearings are raceways made of specially heat treated high nitrogen steel, silicon nitride rolling elements, and a retainer made of PEEK.

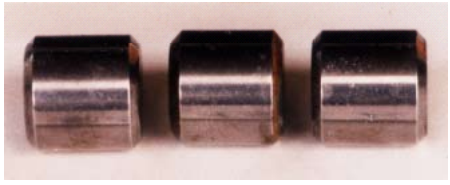
Raceway material:
High-Nitrogen-Steel with an anti-corrosion heat treatment developed by CEROBEAR
- Corrosion resistance (against harsh cleaning detergents containing e.g. H_2O_2 or PAA)
- Superior lifetime due to 2.5x higher overrolling resistance than conventional bearing steels

Corrosion resitant high nitrogen steel (approved in 192h salt spray test)

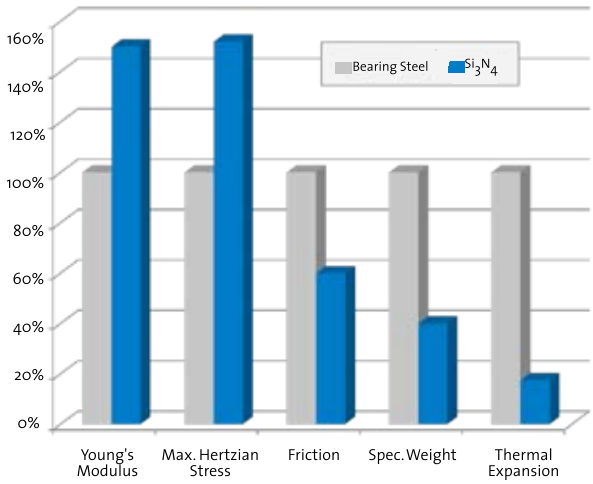
SAE 52100 ("conventional bearing steel")

SAE 52100 chromium coated

AISI 440 C ("corrosion resistant bearing steel")



High Nitrogen Steel (HNS)
CEROBEAR specification



Rolling elements: Pressure densified, high purity Silicon Nitride Ceramic (Si_3N_4)

- Absolute stable chemical structure ; Inert
- Extreme hardness of 1550 HV (~ 80 HRC)
- 40% lower coefficient of friction compared to conventional bearing steel
- Enables media lubrication or dry running (very good emergency operation features)
- Less wear and constant low friction

Cage: Polyetheretherketone (PEEK)

- Chemical resistant against any cleaning detergents
- Temperature resistant up to 400 °F (~ 200 °C)
- Flexible
- Low friction

Lubricant: depending on application

- CEROBEAR offers a wide range of greases for very different applications
  For example: food-compatible, high temperature, high speed and many more

Seals: depending on application

- CEROBEAR chooses from a range of materials the best option based on the customers data.
  For example: FPM (Viton), NBR or special EPDM compounds

CEROBEAR double row hybrid angular contact ball bearings with crowned outer ring for cam follower application.

Applications and conditions

CEROBEAR Hybrid bearings for Food and Beverage applications are being broadly used in state-of-the art machines for:

- **Can-Seamers**
- **Cappers**
  - **Closure Heads**
  - **Turrets**
  - **Cam follower**
- **Fillers**
- **Mixers**
- **Pumps**
- **Starwheelshafts**

CEROBEAR hybrid bearings operating in star wheel shaft

CEROBEAR hybrid bearings are capable of very challenging operating conditions in which conventional steel bearings under-perform and have short lifetimes.
CEROBEAR bearings offer superior properties:

- **Resistance against cleaners (PAA, H_2O_2)**
- **Cleanability (open design)**
- **White room qualification**
- **Constant and low friction**
- **Capability of running media lubricated or completely dry**
- **No particle emission**
- **Special designs possible**
- **Resistance against humidity**

Advanced Bearing Technology for Food & Beverage Machinery

The cold aseptic filling process is increasingly being used for highly hygienic and product gentle filling of a multitude of beverages in lightweight PET bottles today. Commonly used very aggressive cleaning liquids such as PAA or H_2O_2 kill germs very reliably, but also quickly corrode conventional stainless steel bearings. Bearings must be protected behind seals for years or kept out of the white room. This design principle creates another problem, however, because behind seals, germs remain as safe. The arrival of a new generation of rolling bearing technology, introduced by CEROBEAR more than a decade ago, has set a milestone in the design of advanced aseptic filling equipment. Extremely corrosion resistant, through-hardened bearing steels, carefully heat treated by a specifically in-house developed annealing process, in combination with silicon nitride ceramic rolling elements enabled totally new machinery designs where bearings are no longer capsuled but exposed to the corrosive environment. By sharing our experience and engineering expertise with you, we provide complimentary support, to maintain your next generation filling equipment with state-of-the-art technology.

Bearings in the Aseptic Environment

CEROBEAR's unique hybrid rolling bearing technology enables the utilization of rolling bearings directly in the heart of the modern filling machine, the aseptic chamber. CEROBEAR hybrid bearings consist of high nitrogen steel rings, silicon nitride ceramic rolling elements and PEEK cages. They provide extreme corrosion resistance to the typical aggressive detergents like peracetic acid (PAA) and hydrogen peroxide and are capable to operate with media lubrication. Due to their special, unsealed design the bearings do not possess any dead space and allow cleanser and flooding water to pass through them and removing all germs. Thus, CEROBEAR hybrid bearings are the ideal solution for CIP, SIP and ultra-clean processes.

Capping Heads benefit significantly with Cerobear hybrid bearings which allow for an open cleanable design.

Starved Lubrication / Media Lubrication / Dry Run:

Ultra-clean and sterile filling processes require equipment which does not pollute the product in any case. In conventional rolling bearings the lubricant can be a source of such pollution. Standard rolling bearings need to be lubricated by grease or oil, otherwise they fail by an adhesive wear mechanism known as galling. In standard bearings the grease is kept behind seals, but seals wear out and tend to leak in the long-term. In CEROBEAR hybrid bearings, galling is not possible, because the silicon nitride ceramic of the rolling bodies provides a completely stable cyrstallline structure and is completely inert and thus, not capable of reacting with the steel of the races.

Easy Machinery Integration:

The implementation of CEROBEAR aseptic-suited hybrid bearings into existing machines does not require any additional modifications. CEROBEAR engineers design each bearing type particularly to the environment and application. An easy integration is your benefit.

Reduced Total Cost of Ownership:

In many areas along the filling line standard steel bearings present the weakest link and define the down-time of the entire production process. Scheduled, but short, service outages and unplanned stops caused by avoidable bearing failures result in lower productivity and margin. The investment in CEROBEAR's most advanced hybrid bearing technology makes before mentioned scenarios a thing of the past. The superior service life of CEROBEAR hybrid bearings, whether used in aseptic baths, fillers, or cappers, enhances the machinery availability and thus reduces the total cost of ownership. For this reason, the world's leading filling equipment OEMs trust in CEROBEAR's unrivaled products and engineering services for more than 15 years, while filling companies worldwide benefit from a quick ROI due to increased product cleanliness and output. CEROBEAR hybrid rolling bearings also have lower requirements for lubricants and can be operated with process media and in a lot of applications they run totally dry.

Cerobear can seamer hybrid bearings provide corrosion resistance and very low friction which greatly extends life and helps to avoid any can damage during seaming operations.

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We welcome your enquiries from around the world and look forward to hearing from you.

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