

# Corrosion-resistant spherical roller bearings

Next generation protection for the pulp and paper industry



# First-ever corrosion-resistant steel spherical

## Breakthrough bearings offer unprecedented corrosion resistance and fatigue life for increased uptime, productivity and profitability

For pulp and paper mills, unplanned downtime costs due to bearing failures can be as harsh as the conditions that cause them. When the effects of corrosion lead to bearing failures in felt rolls, expenses can average \$25,000 per hour in combined labor, parts and lost production costs. Multiply that figure by the industry averages – four hours of unplanned downtime per failure, occurring two times a year – and annual costs climb to \$200,000.

As expensive and disruptive as these bearing failures can be, mills have long considered them an unavoidable cost of doing business. With the introduction of the industry's first corrosion-resistant steel spherical roller bearing (SRB), MRC is changing this equation forever.

Made from high nitrogen corrosion resistant steel (HNCR), these innovative bearings are ideal for applications in highly corrosive mill operating environments. With corrosion resistance and fatigue life that is far superior to 440C stainless steel, HNCR SRBs give mills an innovative tool to help cut costs and drive profitability.

### Benefits

- Reduce unplanned downtime
- Improve reliability
- Reduce maintenance costs
- Boost productivity
- Extend service life

### Applications

- Wet section felt rolls
- Black liquor applications
- Wire return applications



### Several years of success

*The industry's first corrosion-resistant steel spherical roller bearing has actually been in use for several years at a paper mill in Florida. Outfitted with a V-ring sealing solution, the MRC HNCR bearings were installed on a wet section felt roll. Typical bearing service life in this application is about 36 months.*

*After more than five years of service with no unplanned stops, the bearings were removed for inspection. At 60+ months of continuous service, they showed no signs of surface distress. Since reinstallation, the HNCR bearings have continued to exceed expectations and are now approaching seven years of trouble-free service.*

# roller bearings for pulp and paper applications

## Next-generation bearing steel

Featuring extreme corrosion resistance, superior fatigue life and increased material hardness, HNCR represents the next-generation bearing material of choice – one that’s enabled MRC to produce the industry’s first corrosion-resistant steel spherical roller bearing.

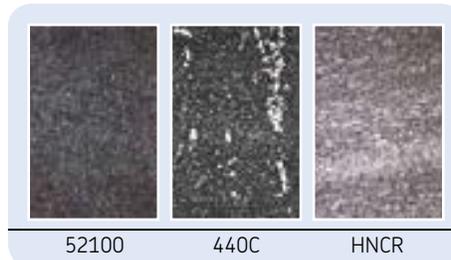
## HNCR: the material differences

HNCR is able to offer far greater corrosion resistance than 52100 and 440C steel due to the addition of nitrogen. As indicated in the chart below, the material composition of 52100 and 440C steel includes no nitrogen at all.

Material	C	N	CR
52100	1.00	–	1.45
440C	1.08	–	17.0
HNCR	.38	.20	15.0

HNCR also offers greater material “cleanliness” than 52100 and 440C, or nearly no presence of sulfides, aluminates, silicates, or globular oxides. The lack of these non-metallic contaminants contributes to extended bearing life, as does the extremely homogeneous structure of HNCR.

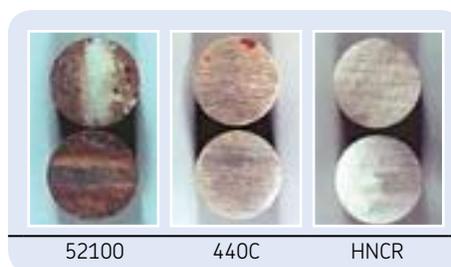
## A close look at structural consistency



As these microscopic photos reveal, HNCR has a much more homogeneous structure compared with 440C. The large carbides in 440C can present stress risers that may lead to premature bearing failure under dynamic loading.

## Extreme corrosion resistance

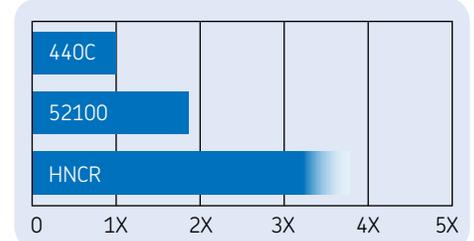
The combined presence of nitrogen and high chromium in HNCR steel delivers unprecedented corrosion resistance. While the Navy Corrosion Test Method photos (below) show the comparative corrosion resistance of 52100, 440C and HNCR after just two weeks, HNCR continued to exhibit zero signs of corrosion after a year-long salt bath immersion.



## Hardness and fatigue life

HNCR is a martensitic through-hardened steel capable of being case- (or induction) hardened. Hardened and tempered HNCR steel provides hardness (58 HRC) comparable to that of 52100. Based on test data from both rotating beam and rolling contact fatigue, HNCR yields a significantly longer fatigue life compared to 52100 and 440C.

## Rolling contact fatigue test



*HNCR bearings not only offer far greater corrosion resistance compared to 440C, they also deliver between two to three times the fatigue life.*



## Available in nine standard sizes with cylindrical or tapered bore\*

DR 22313-HNCR	DR 22316-HNCR	DR 22320-HNCR
DR 22314-HNCR	DR 22317-HNCR	DR 22322-HNCR
DR 22315-HNCR	DR 22318-HNCR	DR 23226-HNCR

\*Tapered bore add “X” ex. DR22313X-HNCR



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MRC products include more than 7,000 bearing variations, all of them backed by nearly 100 years of experience in solving the world's toughest application challenges. As part of the SKF family of products, the MRC brand is backed by the best manufacturing and logistics resources in the business.

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