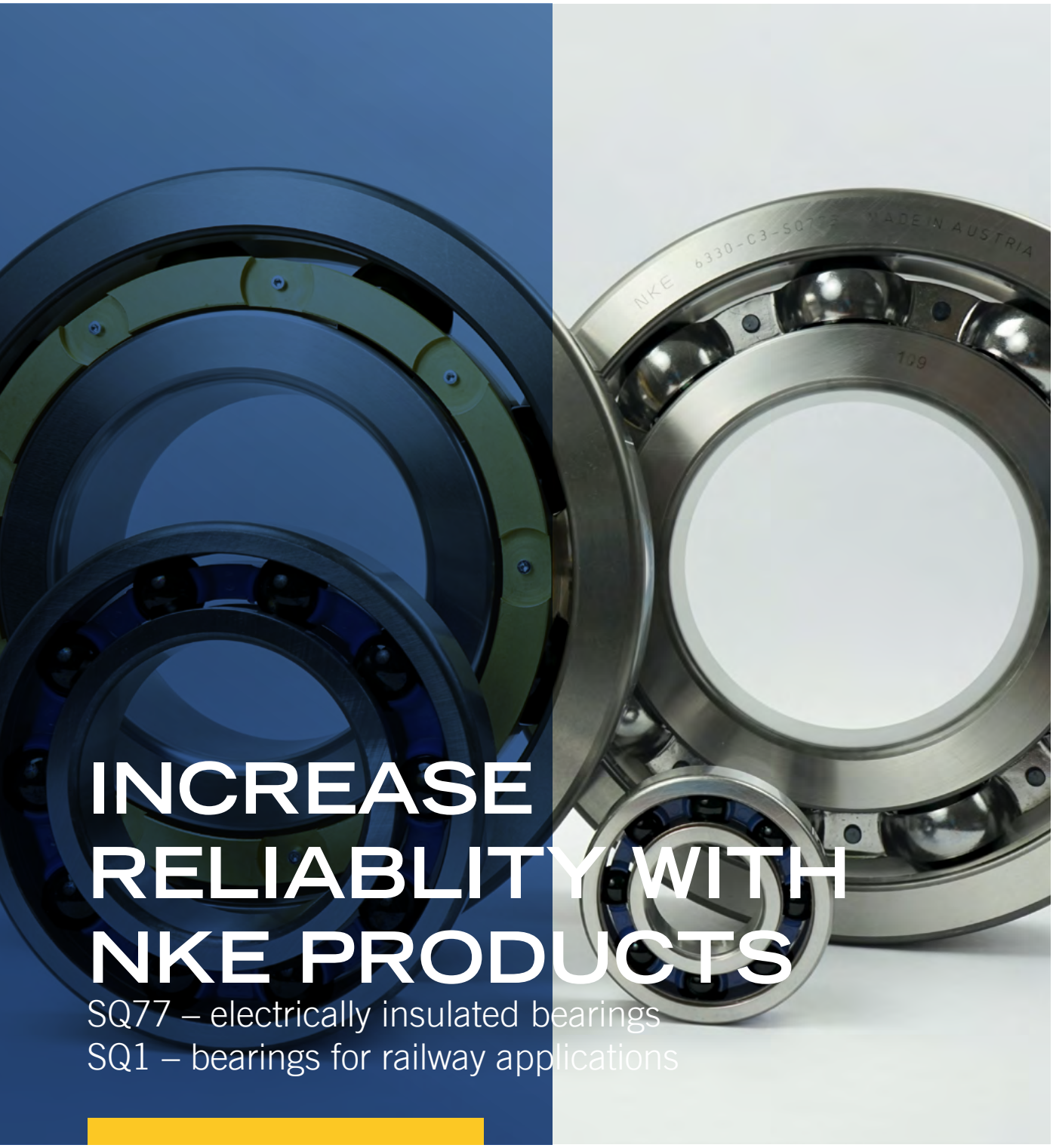
NKE
BEARINGS



INCREASE RELIABLITY WITH NKE PRODUCTS

SQ77 – electrically insulated bearings
SQ1 – bearings for railway applications

FERSAGROUP

EXPERTS IN BEARING SOLUTIONS

Fersa Group

NKE AUSTRIA GmbH is a premium bearing manufacturer with headquarters in Steyr, Austria. The company was founded in 1996 by a group of senior staff members of the former Steyr Wälzlager.

NKE manufactures both standard and special bearings for all industrial applications. Our core competences - engineering, product development, final processing of components, assembly, quality assurance, logistics, sales and marketing - are centralised in Steyr. The site is accredited with ISO 9001:2015 (design, development, manufacturing and distribution of bearings), ISO 14001:2015 and OHSAS 18001.

NKE bearings are distributed through international representative offices and more than 240 distribution outlets in over 60 countries.

We offer:

- / Standard bearings with a comprehensive stock range.
- / Tailor-made bearings for special requirements.
- / Technical service (e.g. consulting, documentation, training etc.)

100% Made in Austria

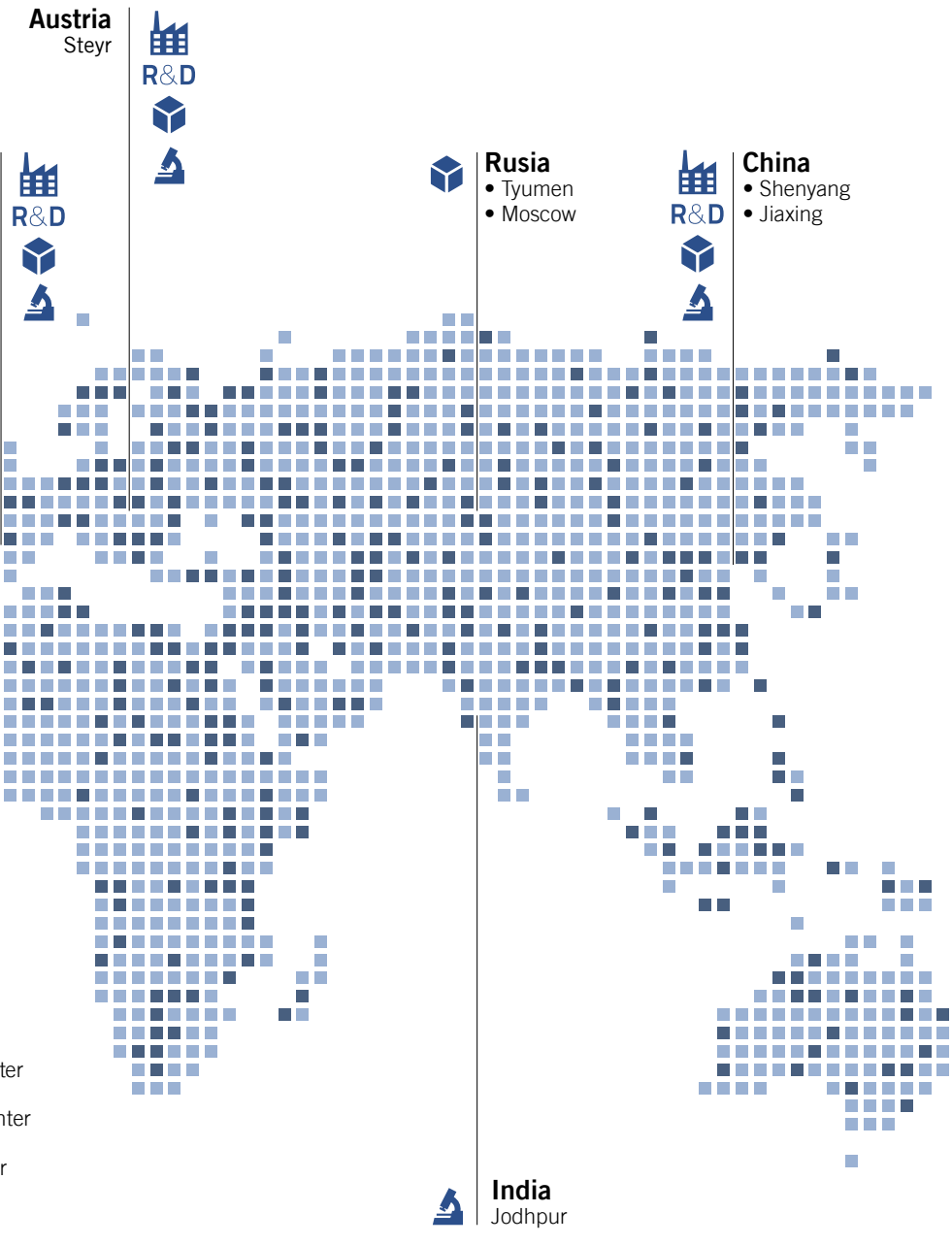
All NKE bearings are manufactured with state-of-the-art equipment. They undergo stringent and documented quality inspection. By using advanced testing and measuring equipment and applying a rigorous quality policy, we can guarantee that every single batch of bearings delivered is of the highest quality standards.

Global Presence

In the right place at the right time.
Local presence in more than

100 countries

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY



Our figures

Fersa Group is constantly growing

20% of sales based on the development of new part numbers.

90 Mio.
Sales in 2020
Fersa Group

X2
Sales in the
last 5 years

4,5%
R+D investment
Total sales

15%
Investment in
the Internet of Things
Total CAPEX

+550
FTE

+3000
New part numbers
per year

* Data from 2019

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

SQ77

Bearing damage by the passage of electrical current

Under adverse conditions the rolling bearings used in electrical machines can sustain damage through current discharge.

The electrical current passing through the bearing may be caused by

- / incorrect or faulty wiring
- / faulty or damaged earth connections resulting in insufficient potential equalisation
- / unshielded and/or asymmetric wiring in electric motors
- / asymmetrical magnetic flux
- / fast acting frequency converters

Damage by current passage: electrical corrosion

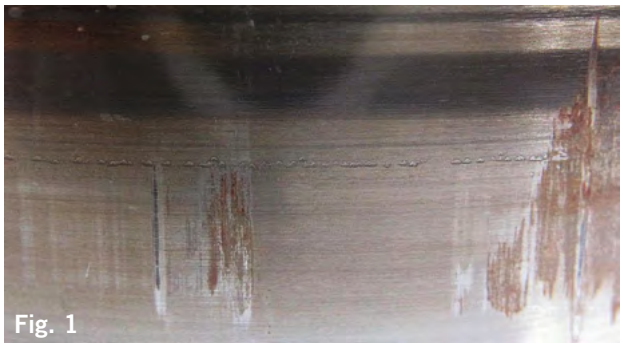


Fig. 1

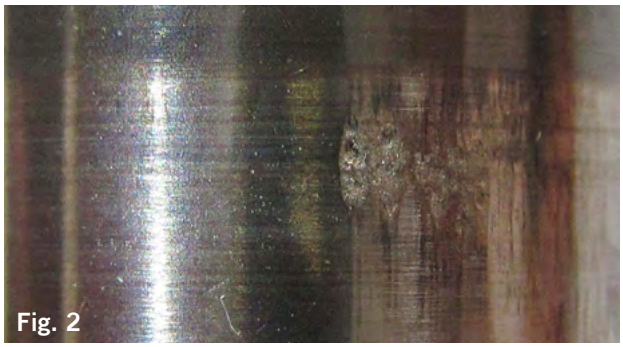


Fig. 2

Current passage has led to a formation of craters/flutes on the inner ring raceway (fig. 1) and the lateral surface of the rolling elements (fig. 2) of a cylindrical roller bearing

NKE electrically insulated bearings – efficient and effective

NKE provides **bearings with oxide ceramic insulating layers on the bearing ring.** Applied with plasma technology the insulation has a guaranteed breakdown resistance of at least **1000V** AC or DC. **Thickness of the coating** > 0.125 mm resp. 0.250 mm for outer / inner ring and side faces.

Two variants are available:

- **/ SQ77:** Insulation on the outer ring
- **/ SQ77E:** Insulation on the inner ring (Fig. below)

Frequently used bearing types in **SQ77** execution (insulation on the outer ring) are available on stock or with short lead times. Examples:

- **/ Cylindrical roller bearings**
  Design: NJ, NU, NUP
  Dimension series: 210-230, 310-330
  Cage: brass and polyamide
  Radial clearance groups: C0, C3, C4
- **/ Deep groove ball bearings**
  Dimension series: 6212-6226; 6312-6326
  Cage: brass
  Radial clearance groups: C3, C4

Other bearing types and SQ77E (insulation on the inner ring) on request.

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

Advantages:

/ SQ77 is a simple and cost effective protection against bearing damage caused by the passage of currents.

/ Insulation eliminates the risk of damaged raceways and lubricant premature aging, what is critical for the correct function of the bearing.

/ Aluminum oxide ceramic insulating coating is done by plasma spraying. Guaranteed minimum breakdown resistance of 1000V or 3000V (AC/DC).

/ SQ77 bearing dimensions and tolerances, as well as Load Capacities, are identical of standard bearing.

/ More economical than insulation on housings or shafts

/ Interchangeable: Same dimensions and technical properties as conventional bearings

/ Coating resistant to mechanical damage if correctly handled

/ SQ77 electrically insulated bearings are also available in combination with other special features to meet special application requirements.

QMS Testing Results / Other Testing Results:

/ 100% of SQ77 bearing is checked with respect to the dielectric strength of its insulation layer.

/ Remaining dimensional and metallurgical inspections follow the NKE quality standards.

/ 3.1. inspection certificate (DIN EN 10204) upon request

Brass cage with reinforced rivets:

/ Approved by leading European engine and train manufacturers

/ Increased rigidity and better behaviour in high temperature and vibrating environments

/ Smoother contact even in poor lubrication situations

Grease Compatibility

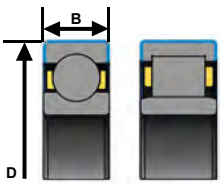
/ 100% compatible with Mobil Polyrex EM

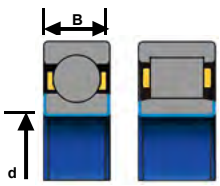
Typical applications:

/ Traction motors of railway vehicles

/ Electric motors (AC/DC)

/ Generators (e.g. in wind turbine generators)





NKE Suffixes	SQ77	SQ77E	-HYB
Meaning	Outer ring coating	Inner ring coating	Bearing with rolling elements made of bearing silicon nitride Si_3N_4. (see next pages)
Diameter range [mm]	Outer diameter $90 \leq D \leq 500$	Bore diameter $75 \leq D \leq 315$	
Bearing Type	DGBB, CRB Special types up to D=1000mm on request	DGBB CRB	

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

NKE HYBRID Bearings: Advantages and benefits

/ **Insulation:** highest protection against passage of electric currents
/ **Higher speed suitability:** centrifugal force reduction due to the light rolling elements
/ **Lightweight:** Silicon nitride is 60% lighter than conventional rolling element steel
/ **Extended service life:** longer bearing life and longer re-lubrication intervals
/ **Reduced friction:** less frictional heat, especially at high speeds
/ **High wear resistance**
/ **Higher rigidity:** less deformation in rolling contact areas
/ **Reduced risk of poor lubrication at high speeds** and fast accelerations, or in the case of insufficient lubricating film
/ **Low running noise operational bearings**
/ Significantly less susceptible to standstill marks known as "false brinelling"
/ Reduced thermal expansion
/ More precise control of preload and bearing clearance
/ Dimensionally interchangeable
/ No additional tools required

Hybrid

NKE hybrid bearings consist of bearing steel rings and bearing silicon nitride Si_3N_4 rolling elements.

Properties of ceramic rolling elements

/ Electrically isolating
/ Low friction coefficient
/ Corrosion resistant
/ Higher modulus of elasticity

ADVANTAGES OF HYBRID BEARINGS WITHIN DIFFERENT APPLICATIONS:	Electrical insulation	High speed suitability	Extended service life	High wear resistance	Low running noise behaviour	Insensitive to false brinelling	Low friction	High rigidity
Electrical Drives - Electric motors - Generators	X	X	X	X	X	X	X	
Wind - Wind Generators	X	X	X	X	X	X	X	
Mechanical Drives - Gearboxes		X	X	X		X	X	X
Railway - Traction Motors	X	X	X	X				
Pumps & Compressors		X	X			X	X	

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

NKE manufactures bearings with ceramic rolling elements

Technologies are advancing rapidly and bearings have to meet more sophisticated and varied requirements under increasingly demanding operating conditions.
In response to these special requirements, NKE Austria and FERSA have committed themselves to the development and manufacturing **hybrid bearings**.

Hybrid bearings can be used in new applications where conventional steel bearings have not been practical.
For example, bearings using ceramic rolling elements are especially designed for applications where high grade electrical insulation is necessary and/or high speeds occur.

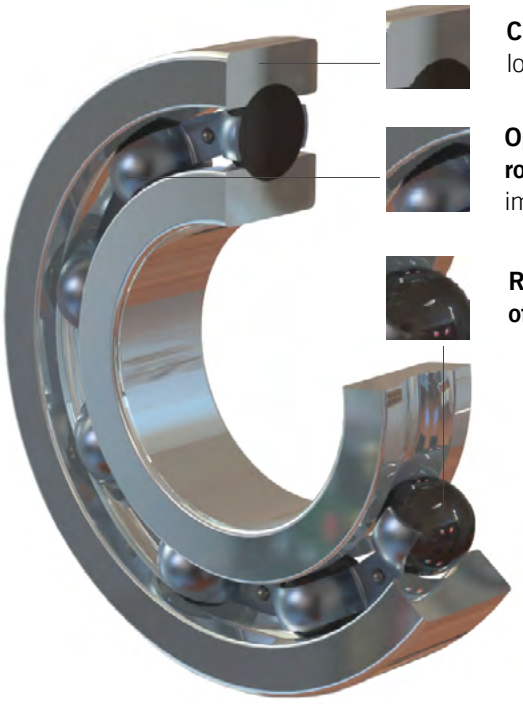
Furthermore NKE premium hybrid bearings come up with many excellent performance characteristics, like extended service life or reduced friction.
NKE provides bearings with ceramic rolling elements.
Frequently used Deep Groove Ball Hybrid bearings are available on stock or with short lead times. Other bearing types, special bearing designs etc. upon demand.

NKE hybrid bearings are identified by the suffix **-HYB** and can replace standard bearings without any modification required.

Example:

BEARING DESIGNATION	6330 __* C3 - HYB
basic bearing designation: TYPE & SIZE	
cage: no suffix, PRESSED STEEL cage	
radial clearance: LARGER THAN NORMAL (C3 clearance)	
rolling element material: SILICON NITRIDE Si_3N_4	

NKE hybrid bearings are especially suitable for applications required to operate with low noise.



Clean bearing steel
long bearing service life

Optimised raceway and rolling elements geometries
improved load capacity

Rolling elements made of Si_3N_4 (Silicon Nitride)

Other bearing types or special bearing designs can be manufactured on demand.

Typical applications:

- / Electric motors (AC/DC)
- / Generators (e.g. in wind turbine generators)
- / High speed applications
- / Traction motors of railway vehicles

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

Traction motor bearings SQ1

Over the years, NKE AUSTRIA has successfully gained approval from numerous renowned companies in the railway industries, including railway operators, service companies and OEM manufacturers.

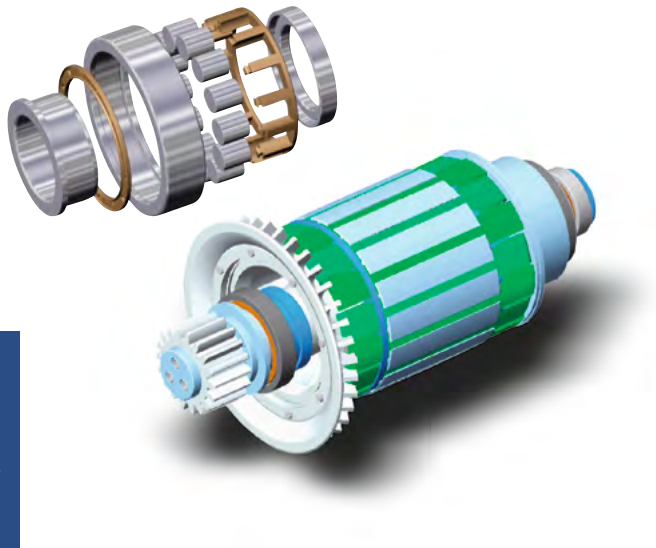
Traction motor bearings must demonstrate long service life.

The most frequently used bearing types are:

/ Cylindrical roller bearings

/ Deep groove ball bearings

/ Electrically insulated bearings
(coated outer ring or inner ring, hybrid)



Designed to ensure reliability in the application

/ According to DIN 43283
(NKE SQ1 is equivalent to SKF VA301 or FAG F1).

/ Thermal stabilisation class S0 of the bearing rings
(150°C min)

/ Larger axial clearance for correct installation and setting of the axial play inside the traction motor resp. gearbox.

/ High grade raceway surface finish, better radial runout precision class, high axial thrust load capability due to optimized contact geometry between roller and guiding flanges, 100% noise inspection, 100% crack inspection of rings (Magnaflux -> bearings inspected that way are marked with a special symbol).

Designed aligned to the withrawn* standard DIN 43283

Higher axial clearance

Increased axial thrust load capacity

-SQ1 bearings reveal rings according to S0 = 150°C thermal stabilization class.
Other thermal stabilization classes upon request

Better radial run out precision class

** the initial standard has been withdrawn because of general progress in bearing design i.e. modern standard bearings cover almost all aspects of the withdrawn standard.*

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

Popular NKE insulated deep groove ball bearings:

Bearing designation	d [mm]	D [mm]	B [mm]	
6212-M-C3-SQ77	60	110	22	
6212-M-C4-SQ77	60	110	22	
6213-M-C3-SQ77	65	120	23	
6213-M-C4-SQ77	65	120	23	
6214-M-C3-SQ77	70	125	24	
6214-M-C4-SQ77	70	125	24	
6215-M-C3-SQ77	75	130	25	
6215-M-C4-SQ77	75	130	25	
6216-M-C3-SQ77	80	140	26	
6216-M-C4-SQ77	80	140	26	
6217-M-C3-SQ77	85	150	28	
6217-M-C4-SQ77	85	150	28	
6218-M-C3-SQ77	90	160	30	
6218-M-C4-SQ77	90	160	30	
6219-M-C3-SQ77	95	170	32	
6219-M-C4-SQ77	95	170	32	
6220-M-C3-SQ77	100	180	34	
6220-M-C4-SQ77	100	180	34	
6221-M-C3-SQ77	105	190	36	
6221-M-C4-SQ77	105	190	36	
6222-M-C3-SQ77	110	200	38	
6222-M-C4-SQ77	110	200	38	
6224-M-C3-SQ77	120	215	40	
6224-M-C4-SQ77	120	215	40	
6226-M-C3-SQ77	130	230	40	
6226-M-C4-SQ77	130	230	40	
6230-M-C3-SQ77	150	270	45	
6312-M-C3-SQ77	60	130	31	
6312-M-C4-SQ77	60	130	31	
6313-M-C3-SQ77	65	140	33	
6313-M-C4-SQ77	65	140	33	
6314-M-C3-SQ77	70	150	35	
6314-M-C4-SQ77	70	150	35	

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

Popular NKE insulated deep groove ball bearings:

Bearing designation	d [mm]	D [mm]	B [mm]	
6315-M-C3-SQ77	75	160	37	
6315-M-C4-SQ77	75	160	37	
6316-M-C3-SQ77	80	170	39	
6316-M-C4-SQ77	80	170	39	
6317-M-C3-SQ77	85	180	41	
6317-M-C4-SQ77	85	180	41	
6318-M-C3-SQ77	90	190	43	
6318-M-C4-SQ77	90	190	43	
6319-M-C3-SQ77	95	200	45	
6319-M-C4-SQ77	95	200	45	
6320-M-C3-SQ77	100	215	47	
6320-M-C4-SQ77	100	215	47	
6321-M-C3-SQ77	105	225	49	
6322-M-C3-SQ77	110	240	50	
6322-M-C4-SQ77	110	240	50	
6324-M-C3-SQ77	120	260	55	
6324-M-C4-SQ77	120	260	55	
6326-M-C3-SQ77	130	280	58	
6326-M-C4-SQ77	130	280	58	
6330-M-C3-SQ77	150	320	65	

Popular NKE insulated cylindrical roller bearings:

Bearing designation	d [mm]	D [mm]	B [mm]	
NJ213-E-M6-C3-SQ77	65	120	23	
NJ213-E-M6-SQ77	65	120	23	
NJ213-E-MA6-C3-SQ77	65	120	23	
NJ213-E-MA6-SQ77	65	120	23	
NJ213-E-TVP3-C3-SQ77	65	120	23	
NJ213-E-TVP3-SQ77	65	120	23	
NJ216-E-M6-C3-SQ77	80	140	26	
NJ216-E-M6-SQ77	80	140	26	

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

Bearing designation	d [mm]	D [mm]	B [mm]	
NJ216-E-TVP3-C3-SQ77	80	140	26	
NJ216-E-TVP3-SQ77	80	140	26	
NJ218-E-TVP3-C3-SQ77	90	160	30	
NJ218-E-TVP3-SQ77	90	160	30	
NJ313-E-M6-C3-SQ77	65	140	33	
NJ313-E-M6-SQ77	65	140	33	
NJ313-E-TVP3-C3-SQ77	65	140	33	
NJ313-E-TVP3-SQ77	65	140	33	
NU213-E-M6-C3-SQ77	65	120	23	
NU213-E-M6-C4-SQ77	65	120	23	
NU213-E-M6-SQ77	65	120	23	
NU213-E-TVP3-C3-SQ77	65	120	23	
NU213-E-TVP3-C4-SQ77	65	120	23	
NU213-E-TVP3-SQ77	65	120	23	
NU216-E-M6-C3-SQ77	80	140	26	
NU216-E-M6-SQ77	80	140	26	
NU216-E-TVP3-C3-SQ77	80	140	26	
NU216-E-TVP3-SQ77	80	140	26	
NU218-E-TVP3-C3-SQ77	90	160	30	
NU218-E-TVP3-SQ77	90	160	30	
NU221-E-M6-C3-SQ77	105	190	36	
NU230-E-M6-C3-SQ77	150	270	45	
NU230-E-M6-SQ77	150	270	45	
NU313-E-M6-C3-SQ77	65	140	33	
NU313-E-M6-C4-SQ77	65	140	33	
NU313-E-M6-SQ77	65	140	33	
NU313-E-TVP3-C3-SQ77	65	140	33	
NU313-E-TVP3-C4-SQ77	65	140	33	
NU313-E-TVP3-SQ77	65	140	33	
NU318-E-M6-C3-SQ77	90	190	43	
NU318-E-M6-SQ77	90	190	43	
NU320-E-M6-C3-SQ77	100	215	47	
NU320-E-M6-SQ77	100	215	47	
NU322-E-M6-C3-SQ77	110	240	50	

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

Popular NKE insulated cylindrical roller ball bearings:

Bearing designation	d [mm]	D [mm]	B [mm]	
NU324-E-M6-C3-SQ77	120	260	55	
NU324-E-M6-C4-SQ77	120	260	55	
NU324-E-M6-SQ77	120	260	55	
NUP213-E-M6-C3-SQ77	65	120	23	
NUP213-E-TVP3-C3-SQ77	65	120	23	
NUP216-E-M6-C3-SQ77	80	140	26	
NUP216-E-M6-SQ77	80	140	26	
NUP216-E-TVP3-C3-SQ77	80	140	26	
NUP216-E-TVP3-SQ77	80	140	26	

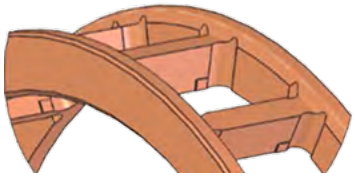
Popular NKE hybrid bearings:

Bearing designation	d [mm]	D [mm]	B [mm]
6326-C3-HYB	130	280	58
6328-C3-HYB	140	300	62
6330-C3-HYB	150	320	65
6332-C3-HYB	160	340	68
6334-C3-HYB	180	380	75

Other bearing types and special bearing types upon demand. Please contact our sales team.

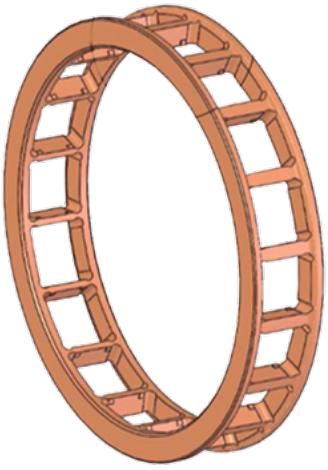
AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

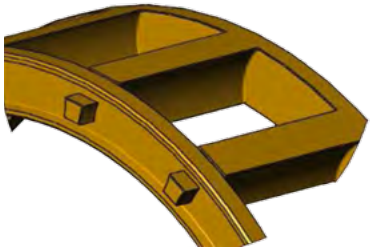
Typical cage designs for CRBs in railway applications or in the electrical drives industry:



MPA
Outer ring guided solid brass cage, designed as a window one piece type.

Prefered if bearings is lubricated with oil





M6
Roller guided solid brass cage for cylindrical roller bearings, cage body designed with trapezoid - shaped machined rivets.

Prefered if bearings is lubricated with grease

Typical cage designs for insulated (SQ77) or hybrid DGBs

Cage design:

M solid brass cage, two piece, ball guided, revited with steel rivets

MR improved running noise and vibration characteristics

Low running noise characteristic

All common bearing sizes available. (62- and 63 series)

Special customized bearings upon request

THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

#1 Case study:
SQ77 bearings in an electric motor with frequency inverter

Application:

Electric motor with frequency converter

Challenge:

Undoubtedly, the risk that the bearing fail due to electrical corosion increases significantly where the application uses a frequency converter.

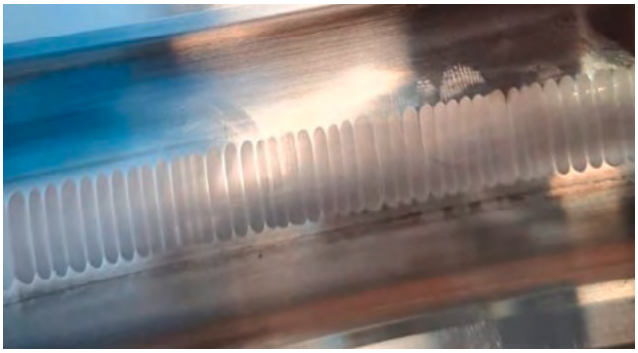
Solution:

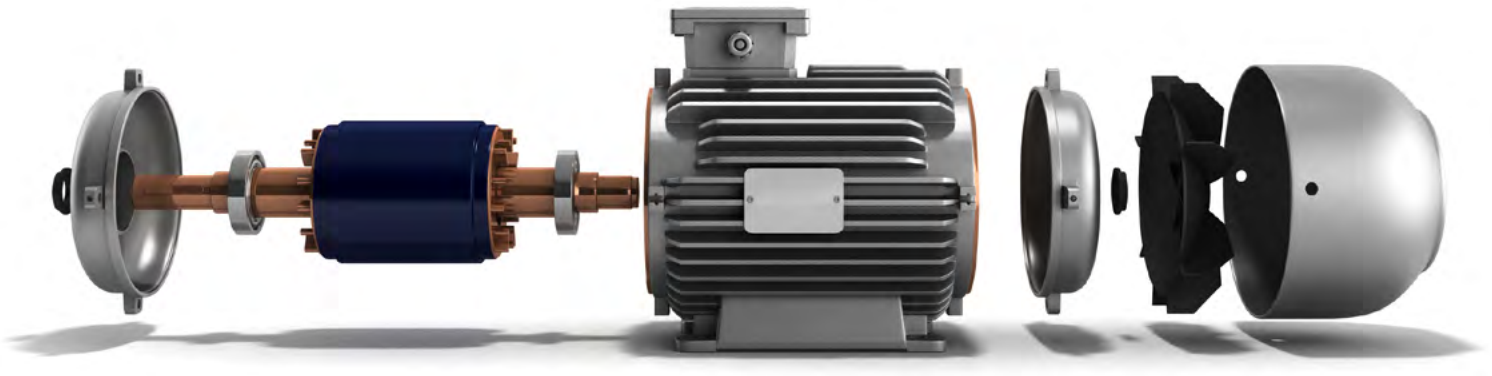
Replace conventional bearing by NKE electric insulated bearings (SQ77).

Benefits:

NKE insulated SQ77 bearings are designed to prevent electric current to passing through the bearing.

Furthermore the SQ77 bearing is fully interchangeable with conventional bearings as well as the SQ77 beairing can be handled as conventionalal bearings.





AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

#2 Case study:
Hybrid bearings in wind turbine generatores

Application:

Bearing setup in a Wind turbine generator 2.5 MW.

Challenge:

Prevention of the bearing from electric erosion and increase the reliability and machine uptime of the wind turbine.

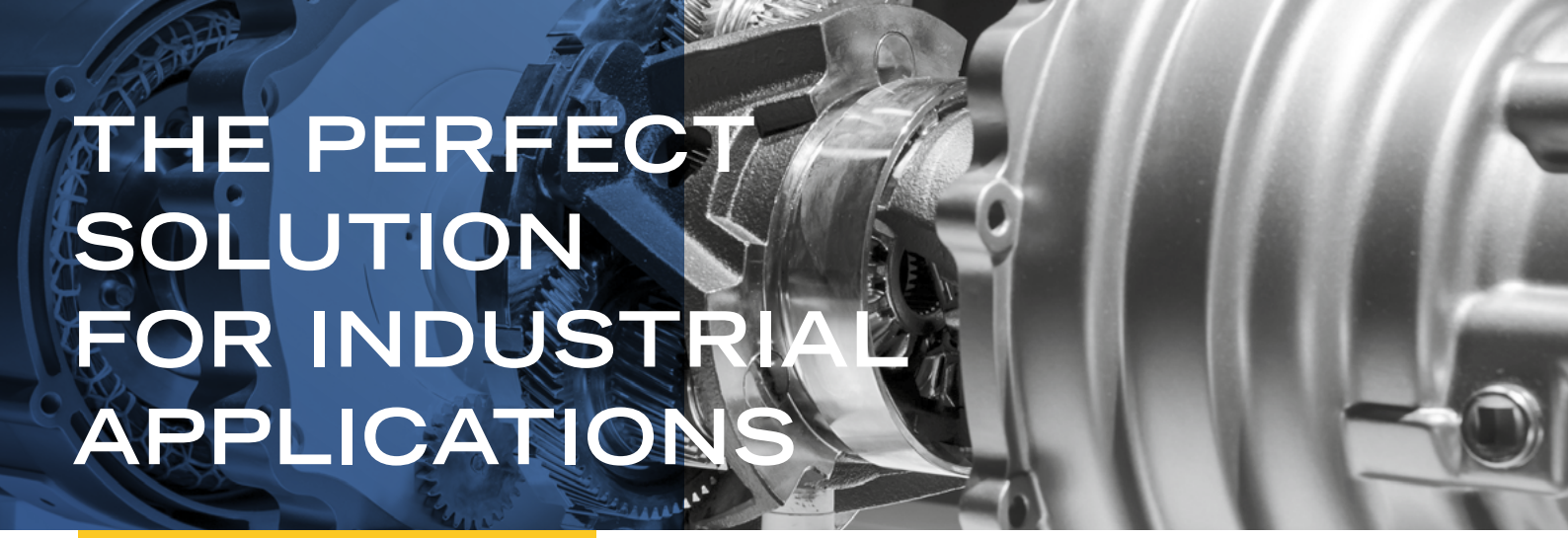
Solution:

NKE Hybrid bearing which composes of rings made of conventional bearing steel and rolling elements made of silicium nitride Si3N4.

Benefits:

NKE hybrids offer the highest protection class against electric current as well as are suitable for extreme operating conditions e.g. high operating speeds.

In addition, hybrid bearings show a longer service life under hostile conditions and increase re-lubrication intervals.



THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

We are trusted by the best!

Generators and electric motors (IT)

Requirement:

/ Bearing setup for a synchros traction generator for a diesel engine locomotive.

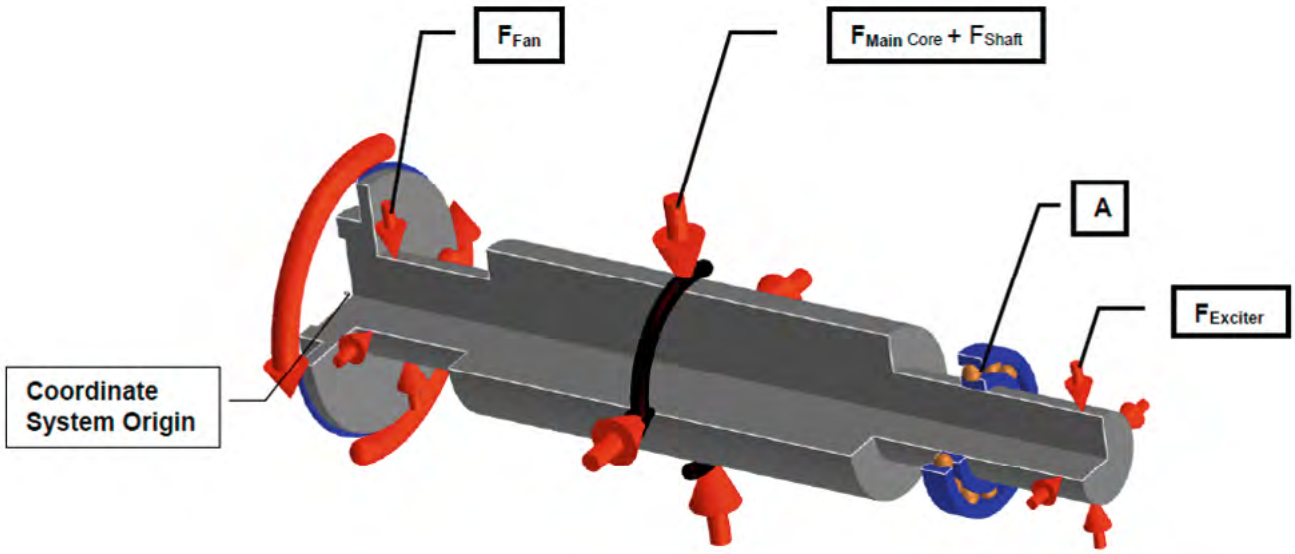
/ Different bearings and load setups have to be considered.

Solution:

NKE provided the bearing concept for the application considering operational conditions which were provided by the customer.

/ 6232-M-C4-SQ77

/ 6234-M-C4-SQ77



AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

Railway service provider (AT)

Requirement:

An austrian railway service provider, is responsible for maintenance and modernization of rolling stock and vehicle components.

Solution:

NKE has been supplying different types of bearings for traction motors:

/ NU324-E-MPA-R200&220-SQ77

/ 6322-M-C5H-SQ77

Metro (RU)

Requirement:

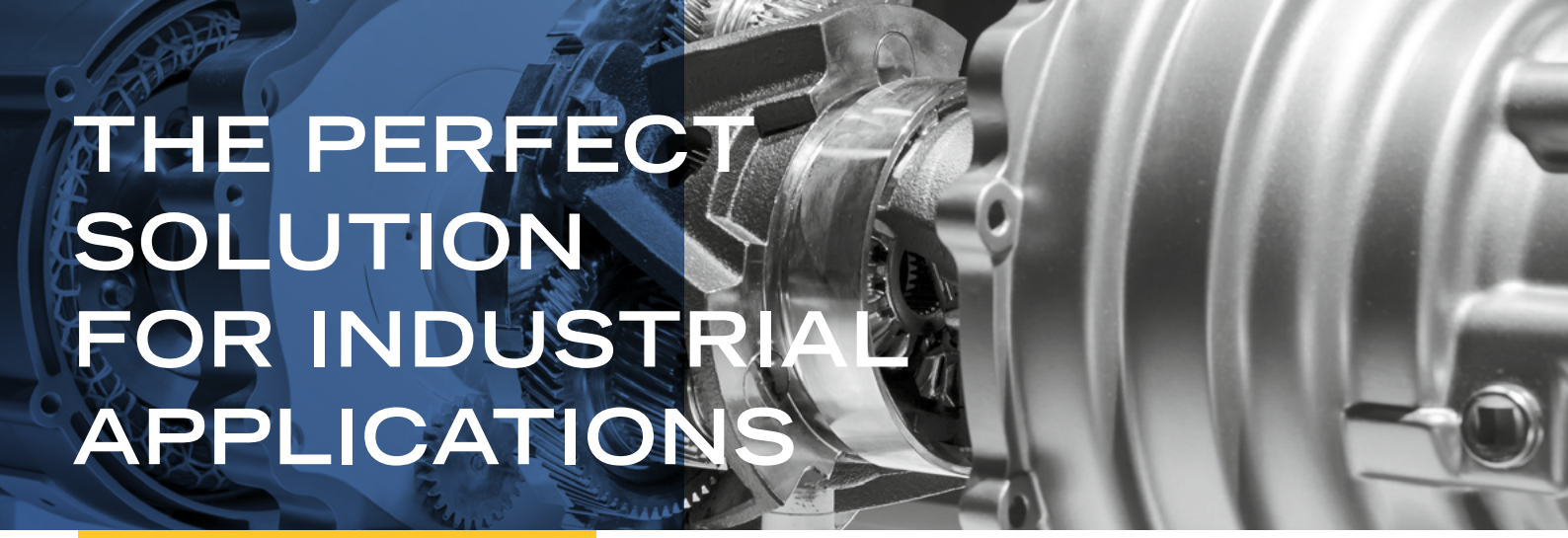
The customer is a leader in the Russian electric engineering industry.

Solution:

NKE supplies electrically insulated bearings for electric traction motors; final customer: Metro (underground) of a Russian city.

/ 6313-M-C3-SQ77

/ NU313-E-M6-C3-SQ77



THE PERFECT SOLUTION FOR INDUSTRIAL APPLICATIONS

Electric Motor Company (USA)

Requirement:

/ Rewinding workshop
Application: Wind Generator 2.5 MW

/ Customer trusted on Hybrid bearings
KOYO 3NCH6330-C3
SKF 6330/HC5C3

Solution:

NKE has convinced the customer to use NKE hybrid bearing instead of competitor bearings.

NKE is able to manufacture more flexible and offers extenstive technical support!

/ 6330-C3-HYB

Wind turbine manufacturer

Requirement:

/ Customer is a state-owned industrial enterprise located in central China

/ NKE was requested to support the customer in the bearing layout for a 1.5 MW wind turbine generator.

Solution:

Services which NKE provided:

/ Bearing evaluation

/ Bearing lifetime calculation and auxiliary calculations e.g. operational clearances, bearing pre-load…

/ Lubrication interval calculations

/ Bearings supplied: 6330-M-C3-SQ77E

AUSTRIAN QUALITY COMBINED WITH ADVANCED TECHNOLOGY

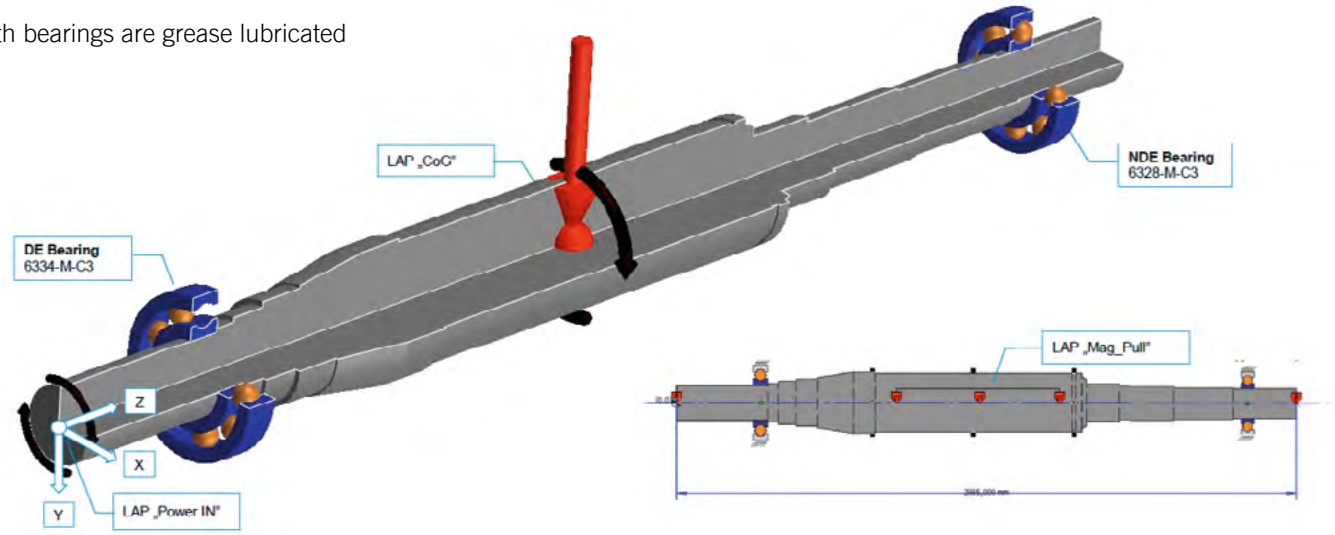
Generator Manufacturer (IN)

Requirement:

/ Bearing setup for an electric generator which is driven by a diesel engine

/ The rotor of the generator is supported by a locating / non-locating bearing arrangement

/ Both bearings are grease lubricated



Solution:

NKE provided a full application report which takes into account the operational conditions which are given by the customer.

/ Life rating calculation

/ Static ratings

/ Friction & Power loss

/ Bearing stiffness

/ Bearing fundamental frequencies for condition monitoring systems

Drive end: 6334-M-C3-SQ77

Non-drive end: 6328-M-C3-SQ77

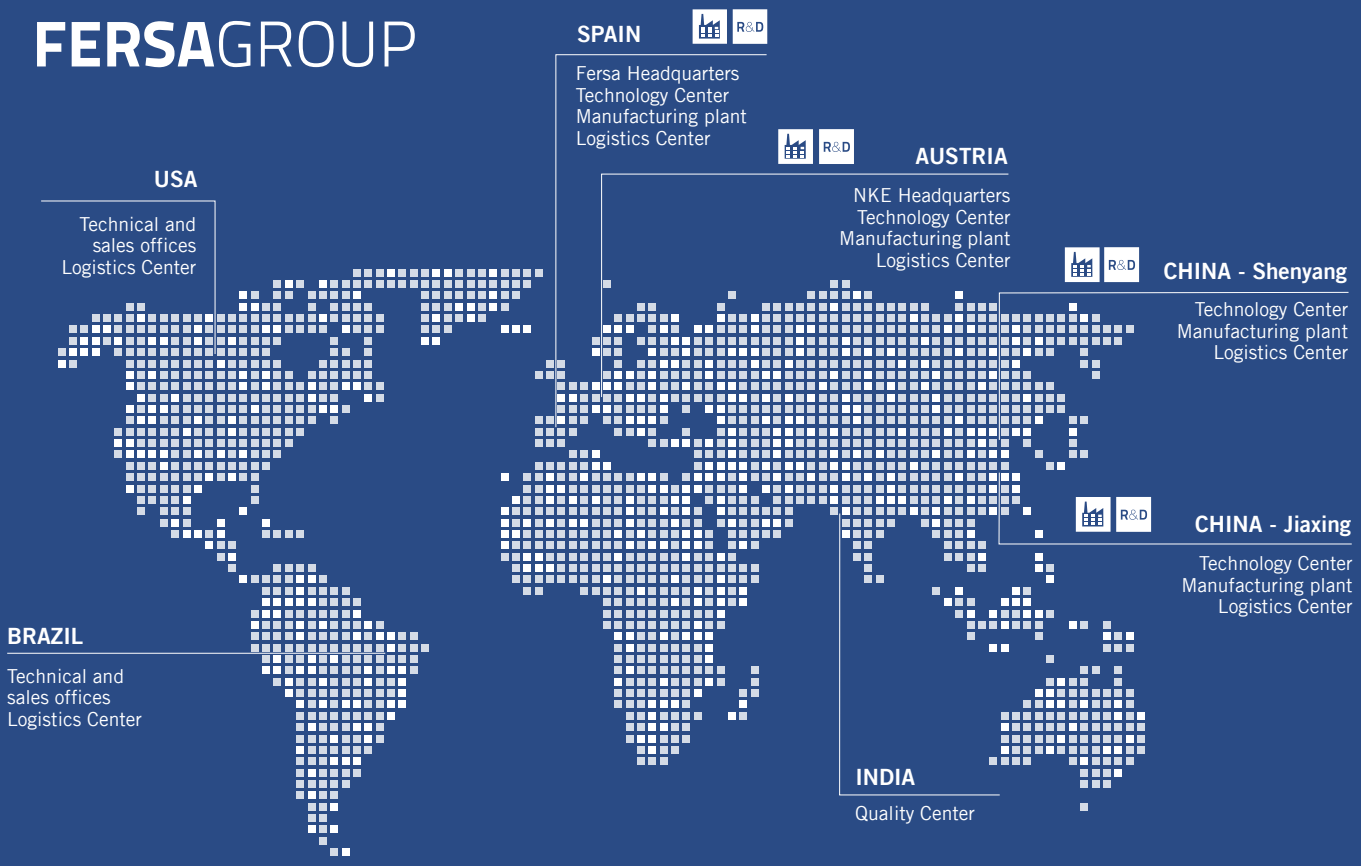
WE ARE FERSA GROUP
A SPANISH-AUSTRIAN COMPANY

Fersa Group was created through the merger of two European bearing manufacturers: Fersa Bearings in Spain and NKE in Austria. Both are globally active in the design, production and distribution of high quality bearings for the global automotive and industrial markets.

Over 50 years of manufacturing experience and the trust of leading OEMs, Tier 1 and their respective aftermarkets endorse our products and services.

Fersa Group has an extensive network of distribution centers that service globally. We count with local facilities in Austria, Brazil, China, Spain and USA and state-of-the-art manufacturing centers in Austria, China and Spain.

FERSAGROUP



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