

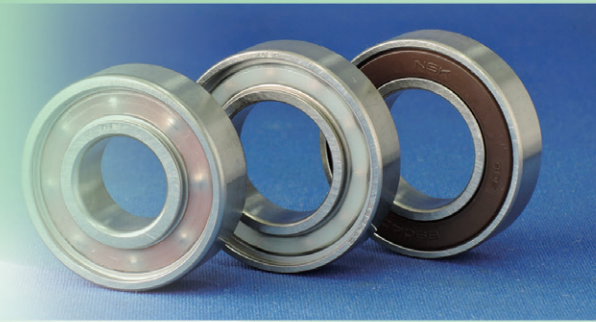
# Rolling Bearings and Precision Machine Components for Food and Beverage Processing Machinery

Through advanced material engineering, lubrication technologies, and precision technologies, NSK products significantly improve the performance of food processing machinery.



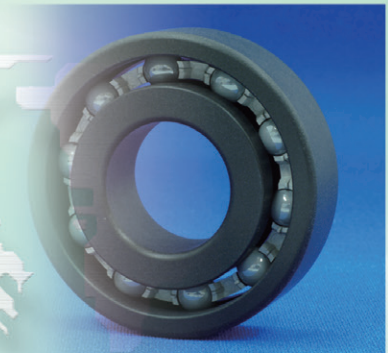


# NSK meets the requirements of food and beverage processing equipment



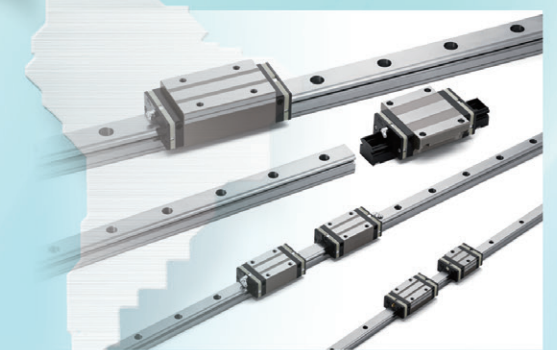
NSK's bearings and precision machine components are used in a variety of machines, such as home electrical appliances, automobiles, semiconductor equipment, and aerospace industry applications.

Through our steadfast technical skill in meeting requests from global industries down to the last minute detail and our R&D and support systems that cater to needs in any country, NSK is developing operations worldwide as a top manufacturer. With our internationally recognized brand, we drive global industries with high quality and technological capability.



## NSK's Global Operations

| Regional headquarters   | Production bases  | Sales bases   |   |
|---|---|---|---|
| <b>Japan</b><br>● Tokyo<br><b>North&amp;South America</b><br>● Ann Arbor<br><b>Europe</b><br>● Maidenhead<br><b>Asia</b><br>● Shanghai<br>● Bangkok | <b>Japan</b><br>●●● Fujisawa<br>● Otsu<br>● Ishibe<br>● Saitama<br>● Matsukawa<br>● Fukushima<br>● Takasaki<br>● Haruna<br><b>North America</b><br>● Clarinda<br>● Franklin<br>● Liberty<br><b>South America</b><br>● Suzano<br><b>Europe</b><br>● Newark<br>● Peterlee<br>● Munderkingen<br>● Turin<br>●●● Kielce<br><b>Asia</b><br>● Jakarta<br>● Bangkok<br>● Chonburi<br>●●● Balakong<br>● Kunshan<br>● Changshu<br>●●● Zhangjiagang<br>● Suzhou<br>● Hangzhou<br>●●● Changwon<br>● Chennai | <b>Japan</b><br>● Tokyo<br>● Nagoya<br>● Osaka etc.<br>Total 21 sites<br><b>North America</b><br>● Ann Arbor<br>● Miami<br>● Mississauga<br>● Montreal<br>● Vancouver<br><b>South America</b><br>● Mexico City<br>● Sao Paul<br>● Belo Horizonte<br>● Joinville<br>● Porto Alegre<br>● Recife<br>● Buenos Aires<br><b>Europe</b><br>● Newark<br>● Ratingen<br>● Stuttgart<br>● Paris<br>● Milan<br>● Turin<br>● Barcelona<br>● Kielce<br>● Warsaw<br>● Istanbul | <b>Africa</b><br>● Johannesburg<br><b>Asia</b><br>● Singapore<br>● Jakarta<br>● Bangkok<br>● Chonburi<br>● Kuala Lumpur<br>● Ipoh<br>● Johor Bahru<br>● Prai<br>● Beijing<br>● Chengdu<br>● Guangzhou<br>● Shanghai<br>● Kunshan<br>● Changshu<br>● Changchun<br>● Chongqing<br>● Hong Kong<br>● Taichung<br>● Tainan<br>● Seoul<br>● Young-Nam<br>● Hanoi<br>● Chennai<br>● Gurgaon<br>● Mumbai<br>● Kolkata<br><b>Oceania</b><br>● Melbourne<br>● Brisbane<br>● Perth<br>● Sydney<br>● Auckland |





# Needs in Food Processing Lines

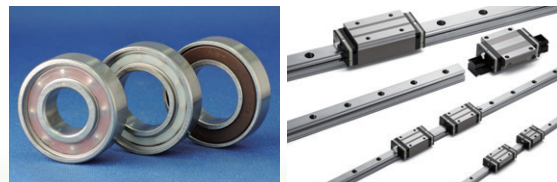
## Raw Material Process

### Required features

Dust proofing, water resistance, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Stainless-steel linear guides
- Waterproof Megatorque Motor



## Primary Process (cutting, mixing)

### Required features

Dust proofing, water resistance, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Stainless-steel linear guides
- Stainless-steel ball screws
- Waterproof Megatorque Motor



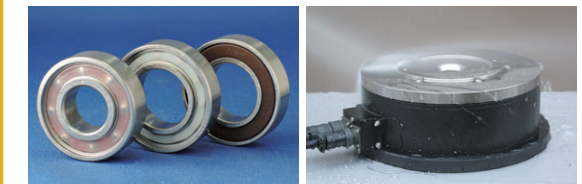
## Secondary Process (molding)

### Required features

Dust proofing, water resistance, low dust emission, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (LG2, LGU)
- Stainless-steel linear guides
- Stainless-steel ball screws
- Waterproof Megatorque Motor



## Packaging Process

### Required features

Low dust emissions, easy maintenance, high speed

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (LG2, LGU)
- Stainless-steel linear guides
- Stainless-steel ball screws
- Linear guides · Ball screws
- Megatorque Motor™



## Conveyance Process

### Required features

Low dust emissions, water resistance, easy maintenance

### Recommended products

- Stainless-steel bearings
- Monocarrier™
- Linear guides · Ball screws
- Stainless-steel linear guides
- Stainless-steel ball screws



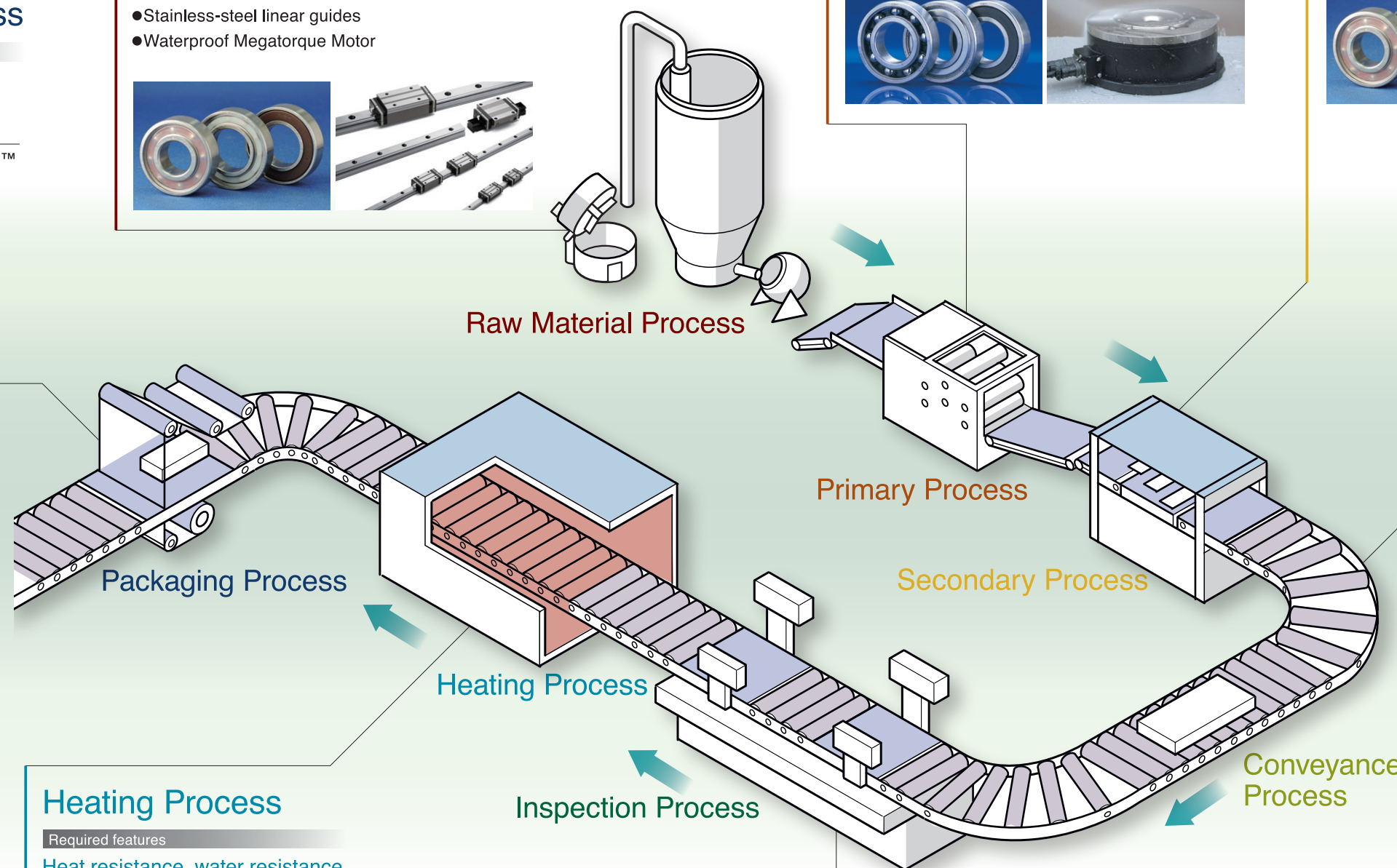
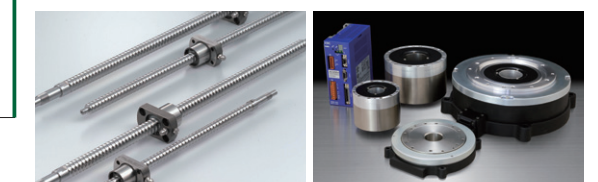
## Inspection Process

### Required features

Water resistance, easy maintenance, high accuracy

### Recommended products

- Stainless-steel bearings
- Stainless-steel linear guides
- Stainless-steel ball screws
- Monocarrier™
- Megatorque Motor™



## Heating Process

### Required features

Heat resistance, water resistance, easy maintenance

### Recommended products

- KPM grease
- Stainless-steel bearings



# Needs in Beverage Processing Lines

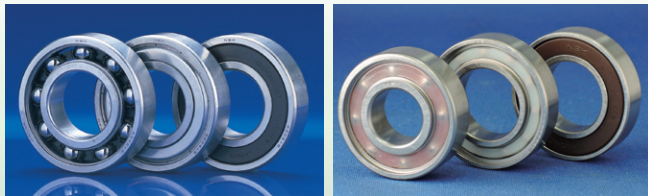
## Filling and Sealing Processes

### Required features

Dust proofing, waterproof, low dust emission, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (LG2, LGU)
- Stainless-steel linear guides
- Waterproof Megatorque Motor



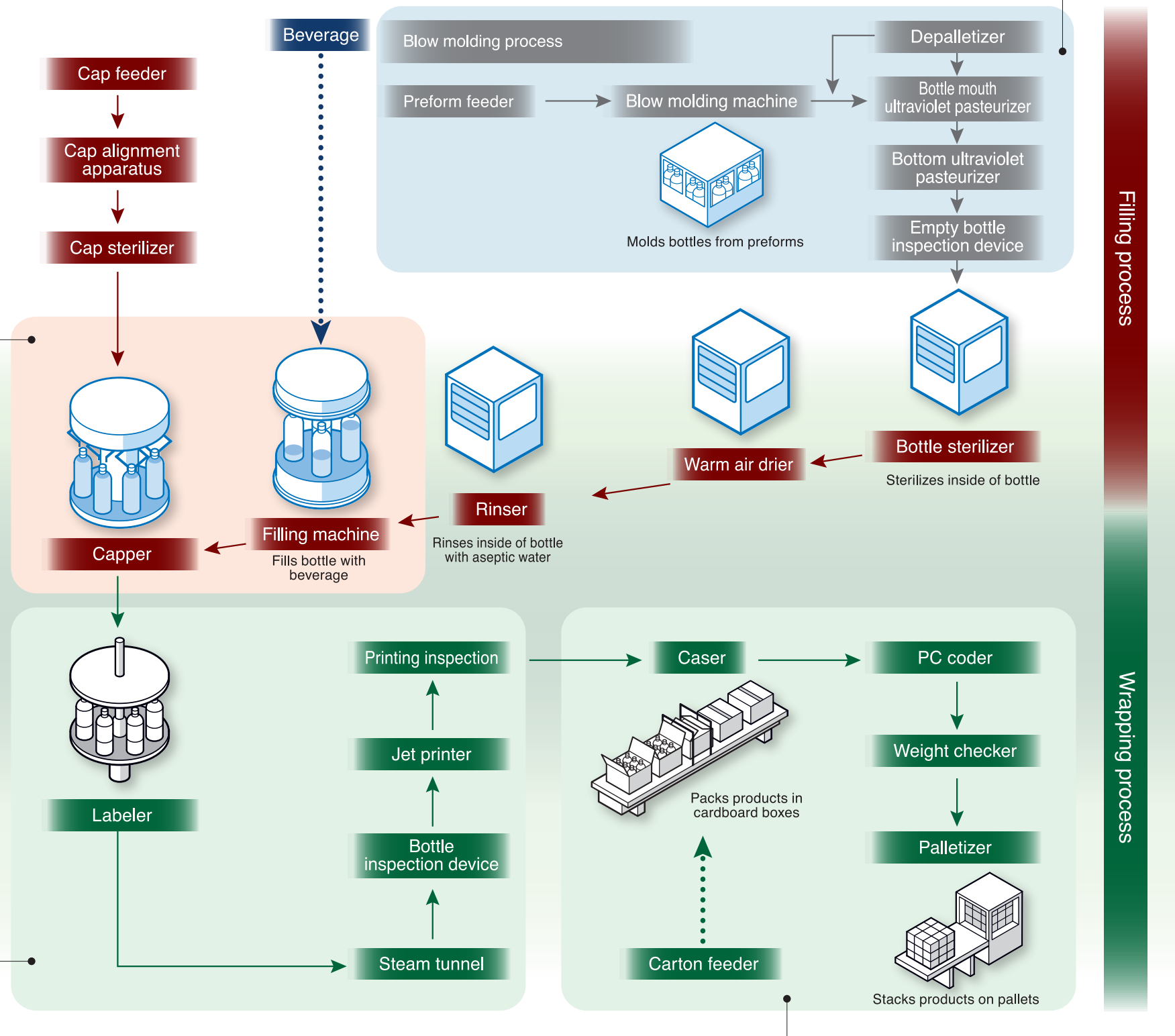
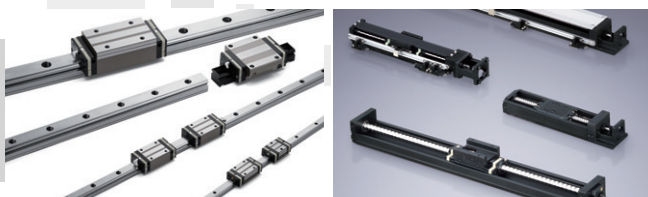
## Inspection Process

### Required features

Waterproof, high speed, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Stainless-steel linear guides
- Stainless-steel ball screws
- Linear guides · Ball screws
- Monocarrier™
- Waterproof Megatorque Motor
- Megatorque Motor™



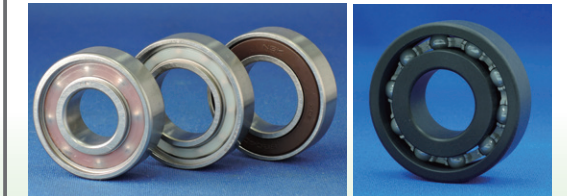
## Bottle Molding Process

### Required features

Dust proofing, water resistance, low dust emission, easy maintenance

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- Stainless-steel bearings
- Clean Grease (LG2, LGU)
- Aqua-Bearing™
- Stainless-steel linear guides
- Waterproof Megatorque Motor



## Packing Process

### Required features

High speed, easy maintenance, high-load operation

### Recommended products

- Molded-Oil™ bearings, NSK K1™ for food machinery
- NSK HPS high-performance standard deep groove ball bearings for industrial machinery
- Linear guides · Ball screws
- Monocarrier™
- Megatorque Motor™





# Product Introduction

## Stainless Steel Bearings (ES1 Stainless Steel Material)

- Corrosion resistance: Better than SUS440C
- Hardness: Equivalent to SUS440C
- Noise level, operating life: Better than SUS440C

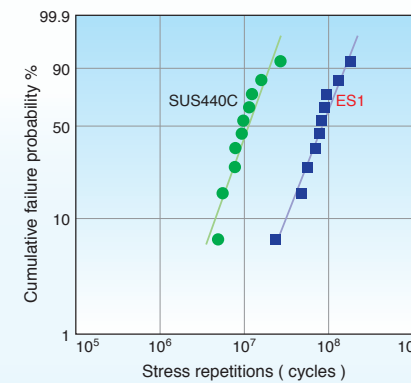
### Corrosion resistance

The corrosion resistance of ES1 is better than SUS440C.

Test piece:  $\varnothing 18 \times 10$ mm  
(Finished with #800 emery paper and passivation treatment was applied.)  
Test solution: 5%NaCl aqueous solution  
Immersion time: 8 hours (room temperature)



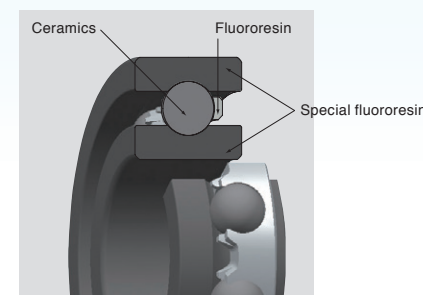
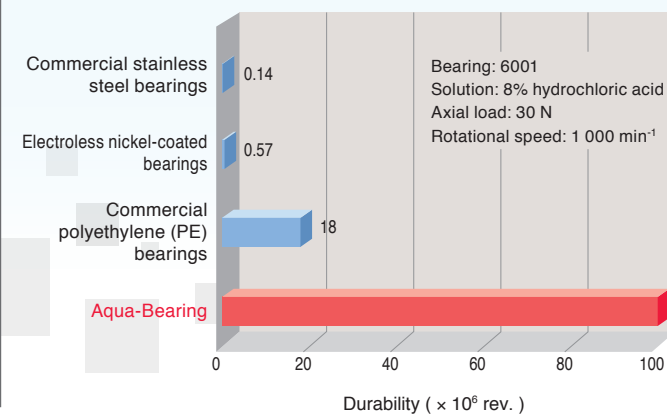
Saltwater spray test (JISZ2371)  
Test solution: 5%NaCl aqueous solution  
Test time: 1 hour  
Test temperature: 35 °C



Test bearing: 51305  
Rolling elements: Ceramics  
Rotational speed: 1 000 min<sup>-1</sup>  
Load: 980 N

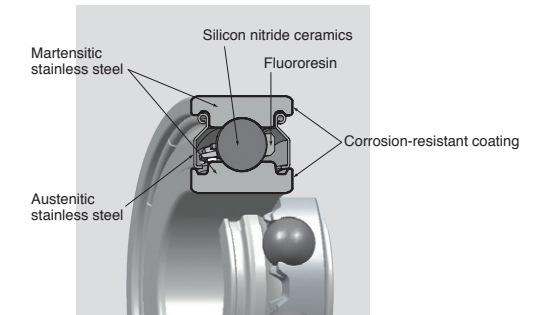
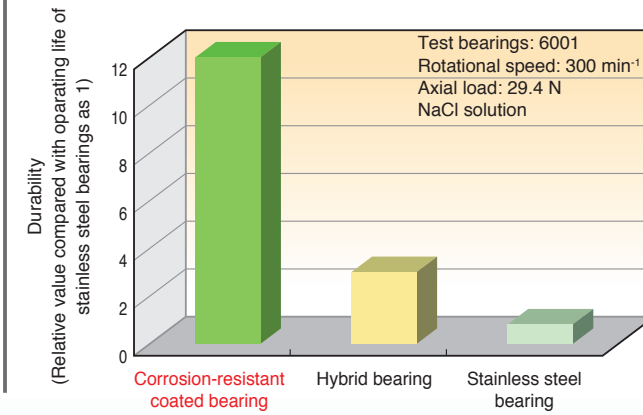
## Aqua-Bearing™

- Corrosion resistance: Five times more resistant than conventional resin bearings in strong acid environments.
- Durability: 1 000 times more durable than stainless steel bearings on the market.
- Maintainability: Self-lubricating fluoro-resin is used.



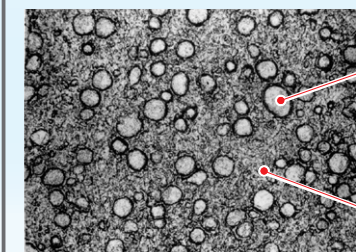
## Highly Corrosion-Resistant Coated Bearings

- Corrosion resistance: Corrosion-resistant against sterilizing liquid, such as sodium hypochlorite solution and oxonia
- Durability: Longer life than SUS440C bearing
- Maintainability: Solid fluoroc lubricant is used.



## Molded-Oil™ Bearings for Food Machinery NSK K1™ Lubrication Unit for Food Machinery

- Environmental friendliness: Lubricant is gradually supplied from porous synthetic resin, lowering grease splatter.
- Water resistance: Contact of lubricant with the roller surface ensures a constant supply of lubricating oil.
- Safety: In NSF-certified H1 lubricant is used.



Portion containing high proportion of polyolefin

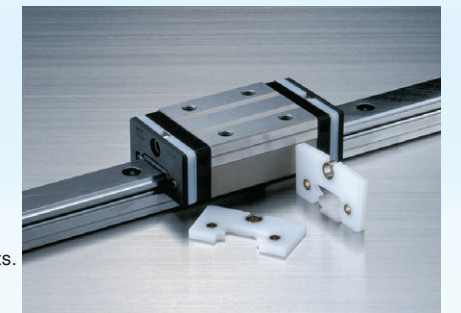
Polyolefin is used for packaging food in supermarkets, replacing dioxin-generating vinyl chloride.

Portion containing high proportion of lubricating oil

Molded-Oil comes in both general-grade (mineral-oil based) and NSF H1\* food grade variants.

\*NSF Category Code H1:Incidental food contact

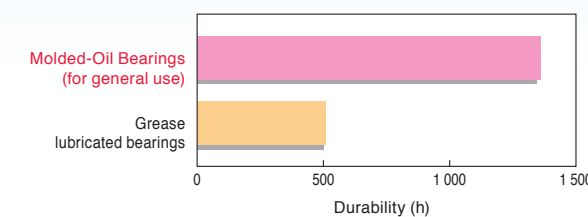
Close-up of Molded-Oil™ 100µm



### Durability in wet condition

Molded-Oil bearings have an operating life twice that of grease-lubricated bearings.

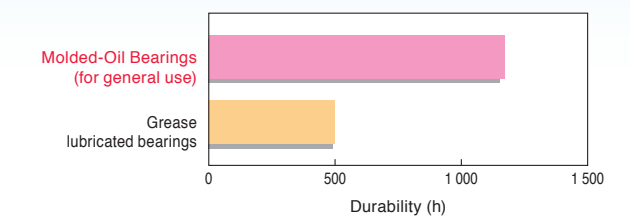
Test bearing: 6000  
Rotational speed: 1 000 min<sup>-1</sup>  
Radial load: 79.4 N  
Axial load: 29.4 N  
Water spraying amount: 0.8 cm<sup>3</sup>/min



### Durability in water-immersed condition

Molded-Oil bearings have an operating life twice that of grease-lubricated bearings.

Test bearing: 6000  
Rotational speed: 1 000 min<sup>-1</sup>  
Radial load: 79.4 N  
Axial load: 29.4 N







# Product Introduction

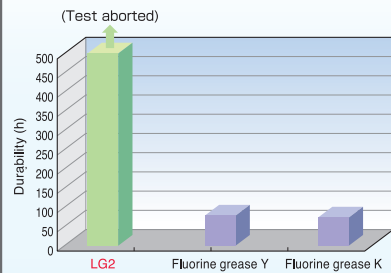
## Clean Grease (LG2, LGU)

- Lower particle emissions: Lower than commercially available fluorine greases
- Life: Over ten times longer than commercially available fluorine greases

### Durability in atmospheric pressure

LG2 and LGU greases feature longer life than other grease at atmospheric pressure.

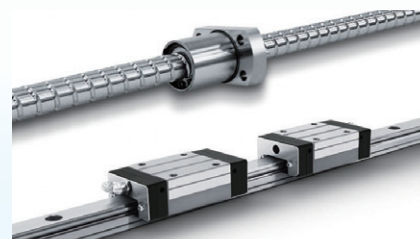
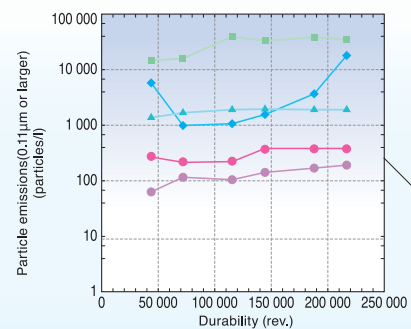
Test bearing: 608  
 Rotational speed: 1 000 min<sup>-1</sup>  
 Axial load: 196 N  
 At atmospheric pressure  
 Temperature: Room temperature



### Particle emission characteristic in the atmospheric pressure

LG2 and LGU greases limit particle emissions at atmospheric pressure

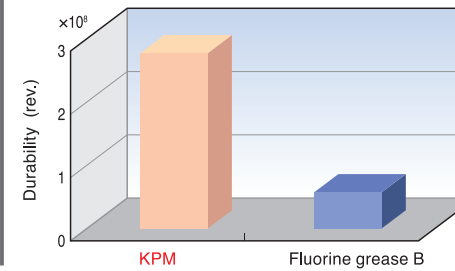
Test bearing: 695VV Rotational speed: 3 600 min<sup>-1</sup>



Legend for particle emission graph:  
 - LG2 (pink line with circles)  
 - LGU (red line with squares)  
 - Commercially available product A: Mineral oil / Li soap (green line with triangles)  
 - Commercially available product B: Ester oil / Li soap (blue line with diamonds)  
 - Commercially available product C: Fluorine oil / Fluorine compound (orange line with stars)

## Heat-Resistant Grease (KPM)

- Heat resistance: Can be used up to 230 °C
- Life: Approximately five times longer than commercially available fluorine greases



### Durability

KPM's operating life is approximately five times longer than commercially available fluorine greases.

Test bearing: 6305  
 Rotational speed: 10 000 min<sup>-1</sup>  
 Axial load: 1 500 N  
 Temperature of outer ring: 200 °C  
 At atmospheric pressure



## Table of Greases

| Name       | Operating temperature range, °C | Feature   | Base oil kinematic viscosity (40 °C), mm <sup>2</sup> /s | Consistency |
|------------|---------------------------------|---|--|-------------|
| RLS        | 0–120                           | For food-processing machinery (NSF category H1) | 150  | 280         |
| BL2        | 0–200                           | For food-processing machinery (NSF category H1) | 415  | 280         |
| NS Hi-Lube | -40–130                         | Wide-range grease                               | 26   | 250         |
| LG2        | -20–70                          | Clean grease                                    | 32   | 199         |
| LGU        | -40–120                         | Wide-range clean grease                         | 96   | 201         |
| KPM        | -20–230                         | Grease for high-temperature use                 | 420  | 290         |

## Greases for Food Processing Machinery

- RLS grease is usable at temperatures up to 120°C while BL2 grease is usable up to 200°C.
- Both RLS and BL2 grease meet Halal and Kosher dietary laws.
- Properties of grease

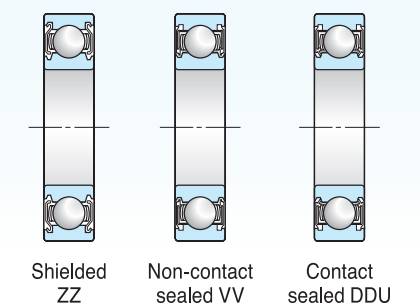
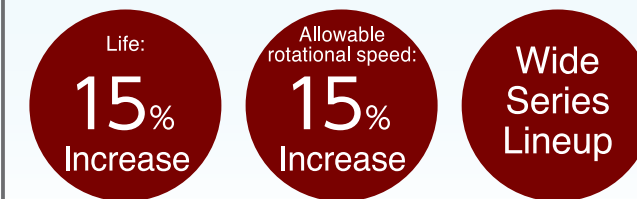
| Name   | RLS                       | BL2 for high temperature |
|--|---------------------------|--------------------------|
| NSF Category                                 | H1                        | H1                       |
| Base oil                                     | Synthetic hydrocarbon oil | Fluorine oil             |
| Thickener                                    | Aluminum alloy soap       | PTFE                     |
| Kinematic viscosity(mm <sup>2</sup> /s,40°C) | 150                       | 415                      |
| Consistency                                  | 280                       | 280                      |
| Water wash-out                               | 7.6%                      | 0.1%                     |
| Operating temperature                        | 0- 120°C                  | 0- 200°C                 |



## NSK HPS High-Performance Standard Deep Groove Ball Bearings for Industrial Machinery

### Features

Compared with conventional products...





# Product Introduction

## Linear Guides (Stainless Steel)

- Corrosion resistance  
Available with fluoride low-temperature chrome plating.
- Durability  
Long operating life equivalent to general steel.
- Maintainability  
Available with K1 lubrication unit for food processing machinery.
- Lineup  
NH Series models NH15 to NH30 and all PE, PU, and NS Series linear guides are available.



## Monocarrier™ (MCM and MCH Series)

- Corrosion resistance  
Fluoride low-temperature chrome plating is standard (rails, roller slides).
- Maintainability  
NSK K1 lubrication unit is standard. The K1 unit for food processing machinery is also available.
- Lineup  
10 models are available. with rail widths ranging from 28 mm to 100 mm.



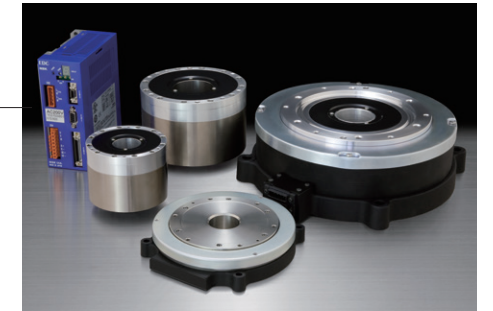
## Standard Ball Screws (PSS and FSS Series)

- Corrosion resistance  
Available with fluoride low-temperature chrome plating.
- Lineup  
Products with diameters of 6-25 mm and leads of 5-60 mm are available.



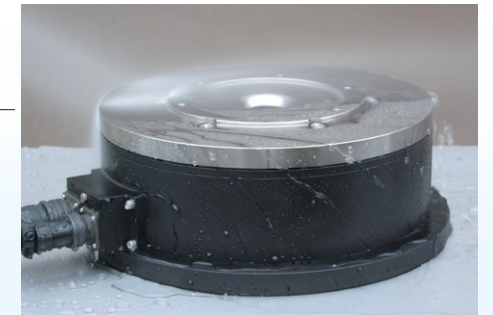
## Megatorque Motor™ (PS and PN Series)

- Low dust emission without regurgitating decelerator.
- Maintainability: Maintenance-free
- Lineup:  
Outer rotor motors and inner rotor motors are available.  
Maximum output torque: 6 N·m—180 N·m



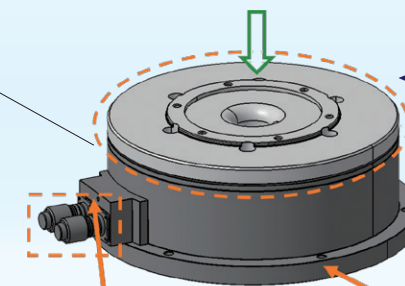
## Environment-Resistant Megatorque Motor (Z Series)

- Environment resistance: World's first IP66 rating under IEC standards
- Durability: Withstands high-pressure water jets
- Maintainability: Maintenance-free



### Rotor

Withstands high loads  
Axial load: 9 500 N  
Moment load: 200 N·m



Mechanism to mitigate pressure from water jets is introduced to meet IP66 rating (with rotor in motion).

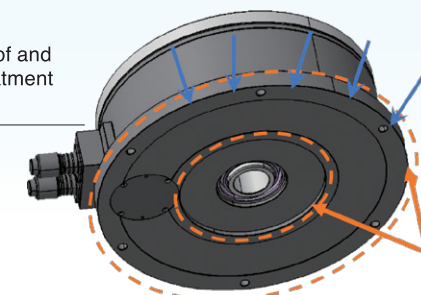
Rigidity and accuracy of rotor are improved for enhanced sealing. (Axial and radial runout of output shaft: 10 μm)

Connector terminal.  
(Bottom routing is also possible.)

AN air purge hole is provided to enhance reliability.

### Motor securing face

Since the bottom face is waterproof and dustproof, with O-ring surface treatment is not necessary.



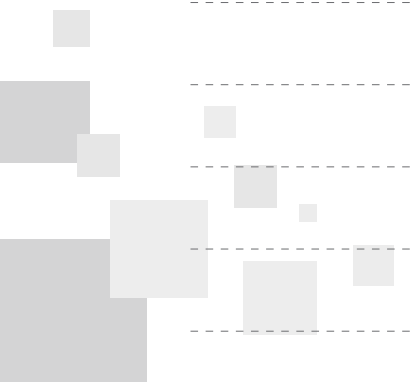
The outer and inner diameters are designed with centering easy.



Memo

Lined writing area for page 13, featuring horizontal dashed lines for text entry.

Lined writing area for page 14, featuring horizontal dashed lines for text entry.





## Worldwide Sales Offices

P: Phone ☆: Head Office

### NSK LTD. HEADQUARTERS, TOKYO JAPAN

INDUSTRIAL MACHINERY BUSINESS DIVISION-HEADQUARTERS P: +81-3-3779-7227  
 AUTOMOTIVE BUSINESS DIVISION-HEADQUARTERS P: +81-3-3779-7189

### Africa

#### South Africa:

**NSK SOUTH AFRICA (PTY) LTD.**  
 SANDTON P: +27-011-458-3600

#### Aisia and Oceania

#### Australia:

**NSK AUSTRALIA PTY. LTD.**  
 MELBOURNE ☆ P: +61-3-9765-4400  
 SYDNEY P: +61-2-9839-2300  
 BRISBANE P: +61-7-3347-2600  
 PERTH P: +61-8-9256-5000

#### New Zealand:

**NSK NEW ZEALAND LTD.**  
 AUCKLAND P: +64-9-276-4992

#### China:

**NSK (SHANGHAI) TRADING CO., LTD.**  
 JIANGSU ☆ P: +86-512-5796-3000

#### NSK (CHINA) INVESTMENT CO., LTD.

JIANGSU ☆ P: +86-512-5796-3000  
 BEIJING P: +86-10-6590-8161  
 TIAN JIN P: +86-22-8319-5030  
 CHANGCHUN P: +86-431-8898-8682  
 SHENYANG P: +86-24-2334-2868  
 DALIAN P: +86-411-8800-8168  
 NANJING P: +86-25-8472-6671  
 FUZHOU P: +86-591-8380-1030  
 WUHAN P: +86-27-8556-9630  
 QINGDAO P: +86-532-5568-3877  
 GUANGZHOU P: +86-20-3817-7800  
 CHANGSHA P: +86-731-8571-3100  
 LUOYANG P: +86-379-6069-6188  
 XI'AN P: +86-29-8765-1896  
 CHONGQING P: +86-23-6806-5310  
 CHENGDU P: +86-28-8528-3680

#### NSK CHINA SALES CO., LTD.

JIANGSU ☆ P: +86-512-5796-3000

#### NSK HONG KONG LTD.

HONG KONG ☆ P: +852-2739-9933  
 SHENZHEN P: +86-755-25904886

#### Taiwan:

#### TAIWAN NSK PRECISION CO., LTD.

TAIPEI ☆ P: +886-2-2772-3355  
 TAICHUNG P: +886-4-2708-3393  
 TAINAN P: +886-6-215-6058

#### India:

#### NSK BEARINGS INDIA PRIVATE LTD.

CHENNAI ☆ P: +91-44-2847-9600  
 MUMBAI P: +91-22-2838-7787  
 JAMSHEDPUR P: +91-657-2421144  
 GURGAON P: +91-124-4838000

#### Indonesia:

**PT. NSK INDONESIA**  
 JAKARTA P: +62-21-252-3458

#### Korea:

**NSK KOREA CO., LTD.**  
 SEOUL P: +82-2-3287-0300

#### Malaysia:

**NSK BEARINGS (MALAYSIA) SDN.BHD.**  
 SHAH ALAM ☆ P: +60-3-7803-8859  
 PRAI P: +60-4-3902275  
 JOHOR BAHRU P: +60-7-3546290  
 IPOH P: +60-5-2555000

#### Philippines:

**NSK REPRESENTATIVE OFFICE**  
 MANILA P: +63-2-893-9543

#### Singapore:

**NSK INTERNATIONAL (SINGAPORE) PTE LTD.**  
 SINGAPORE P: +65-6496-8000

#### NSK SINGAPORE (PRIVATE) LTD.

SINGAPORE P: +65-6496-8000

#### Thailand:

**NSK BEARINGS (THAILAND) CO., LTD.**  
 BANGKOK P: +66-2320-2555

#### Vietnam:

**NSK VIETNAM CO., LTD.**  
 HANOI P: +84-24-3955-0159

#### NSK REPRESENTATIVE OFFICE

HO CHI MINH CITY P: +84-28-3822-7907

#### Europe

#### United Kingdom:

**NSK EUROPE LTD. (EUROPEAN HEADQUARTERS)**  
 MAIDENHEAD P: +44-1628-509-800

#### NSK UK LTD.

NEWARK P: +44-1636-605-123

#### France:

**NSK FRANCE S.A.S.**  
 PARIS P: +33-1-30-57-39-39

#### Germany:

**NSK DEUTSCHLAND GMBH**  
 DUSSELDORF ☆ P: +49-2102-4810  
 STUTTGART P: +49-711-79082-0  
 WOLFSBURG P: +49-5361-27647-10

#### Italy:

**NSK ITALIA S.P.A.**  
 MILANO P: +39-299-5191

#### Netherlands:

**NSK EUROPEAN DISTRIBUTION CENTRE B.V.**  
 TILBURG P: +31-13-4647647

#### Poland:

**NSK REPRESENTATIVE OFFICE**  
 WARSAW P: +48-22-645-1525

#### Russia:

**NSK POLSKA SP. Z O.O.**  
 SAINT-PETERSBURG P: +7-812-332-5071

#### Spain:

**NSK SPAIN S.A.**  
 BARCELONA P: +34-93-289-2763

#### Turkey:

**NSK RULMANLARI ORTA DOGU TIC. LTD. STI.**  
 ISTANBUL P: +90-216-5000-675

#### United Arab Emirates:

**NSK BEARINGS GULF TRADING CO.**  
 DUBAI P: +971-(0)4-804-8200

#### North and South America

#### United States of America:

**NSK AMERICAS, INC. (AMERICAN HEADQUARTERS)**  
 ANN ARBOR P: +1-734-913-7500

#### NSK CORPORATION

ANN ARBOR P: +1-734-913-7500

#### NSK PRECISION AMERICA, INC.

FRANKLIN ☆ P: +1-317-738-5000

SAN JOSE P: +1-408-944-9400

#### NSK LATIN AMERICA, INC.

MIAMI P: +1-305-477-0605

#### Canada:

**NSK CANADA INC.**  
 TORONTO ☆ P: +1-905-890-0740  
 MONTREAL P: +1-514-633-1220

#### Argentina:

**NSK ARGENTINA SRL**

BUENOS AIRES P: +54-11-4704-5100

#### Brazil:

**NSK BRASIL LTDA.**  
 SUZANO ☆ P: +55-11-4744-2500  
 JOINVILLE P: +55-47-3422-2239

#### Peru:

**NSK PERU S.A.C.**

LIMA P: +51-493-4385

#### Mexico:

**NSK RODAMIENTOS MEXICANA, S.A. DE C.V.**  
 SILAO, GUANAJUATO P: +52-472-500-9500

< As of July 2020 >

For the latest information, please refer to the NSK website.

[www.nsk.com](http://www.nsk.com)

NSK Ltd. has a basic policy not to export any products or technology designated as controlled items by export-related laws. When exporting the products in this brochure, the laws of the exporting country must be observed. Specifications are subject to change without notice and without any obligation on the part of the manufacturer. Every care has been taken to ensure the accuracy of the data contained in this brochure, but no liability can be accepted for any loss or damage suffered through errors or omissions. We will gratefully acknowledge any additions or corrections.

For more information about NSK products, please contact: \_\_\_\_\_

