

## Toward Carbon Neutrality Overview of Eco-Products



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The aim of the **IKO** Group is to realize a bountiful

global environment through manufacturing

Carbon Neutrality

**Oil Minimum**  
Environmentally Friendly **IKO**

We at the IKO Group, based on our "Oil Minimum" philosophy, have been consistently engaged in environmentally friendly manufacturing. With the realization of carbon neutrality as one of our major issues, we are working to reduce CO<sub>2</sub> emissions through the entire product life cycle, from procurement of raw materials through manufacturing, transport, disposal, and recycling.

Through IKO eco-products, we contribute to the realization of carbon neutrality.



**Environmental initiatives**

- 1983** • Launch of Japan's first two-row roller recirculating linear motion rolling guide (LRW)
- 1990** • Launch of Japan's first four-row roller recirculating linear motion rolling guide (LRWX)
- 1993** • Launch of the world's first integrated inner-outer ring crossed roller bearings (CRBH)
- 1997** • Launch of the world's first compatibility system for linear motion rolling guides, "Interchangeable Specifications"
- 2001** • Acquisition of environmental management system international standard ISO14001
- 2002** • Launch of the world's first linear motion rolling guide with embedded C-Lube lubrication
- 2019** • Launch of the world's first linear motion rolling guide using liquid crystal lubricant
- 2023** • Introduction of industry first off-site virtual PPA

IKO products contribute to the reduction of CO<sub>2</sub> throughout the entire product life cycle.





# C-Lube Maintenance Free Series

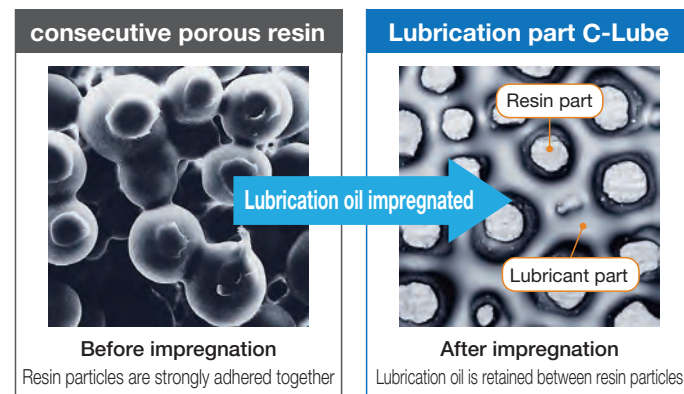
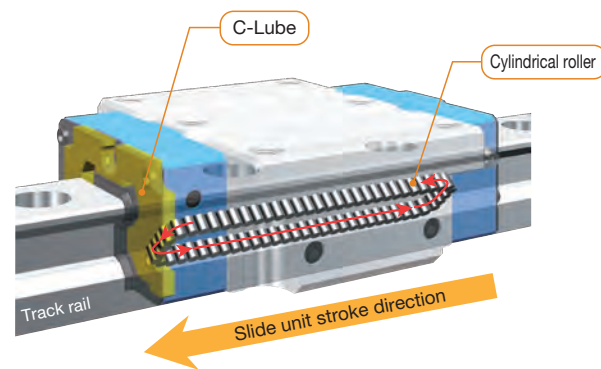


CO<sub>2</sub> emissions at procurement **99% reduced** \*Calculated from usage amount ratios



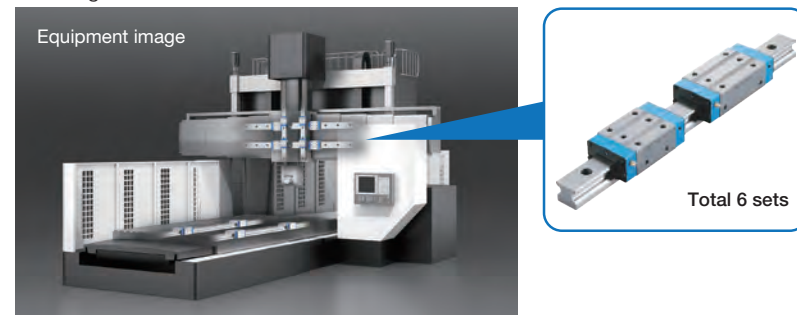
## What is C-Lube?

Made of consecutive porous resin formed using a molding of fine resin powder, it is a lubrication part impregnated with a large amount of lubrication oil in its open pores by using internal capillary action. By embedding this material within our products, we have created the C-Lube maintenance-free series which minimizes oil usage. Mounting dimensions, frictional resistance, and so on retain the same basic performance as conventional products. Because the C-Lube lubrication oil is impregnated after molding, replacement with food-grade oil, etc., is also possible.

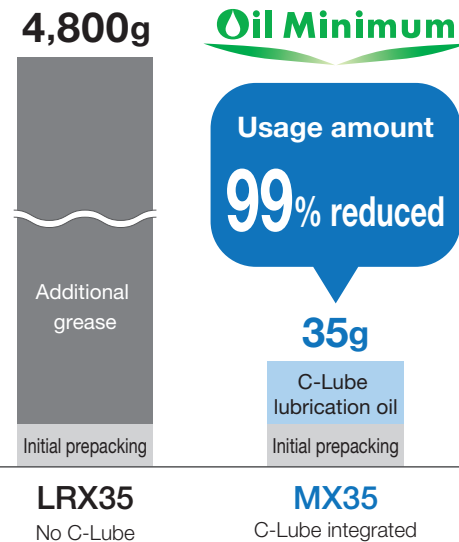


## Oil minimized effect

In most cases, C-Lube integrated products maintain lubrication performance throughout the life of the equipment without additional lubricant added, sharply reducing the amount of lubricant used.



Equipment specifications	<ul style="list-style-type: none"> <li>Model numbers in use: MX35, LRX35</li> <li>Axis configuration: 3 axes (X-axis, Y-axis, Z-axis)</li> <li>Number of rails: 2/axis</li> <li>Number of units: 2/rail</li> </ul>	Greasing conditions	<ul style="list-style-type: none"> <li>Amount of grease each time: 20g/unit</li> <li>Greasing interval: Every 3 months</li> <li>Usage period: 5 years</li> </ul>
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## Total reduced costs

In addition to the reduced lubricant costs, various maintenance-related initial costs and running costs can be reduced.



Reduction of initial costs	Reduction of running costs
<ul style="list-style-type: none"> <li>✓ Lubricant supply equipment costs</li> <li>✓ Assembly work-hours</li> <li>✓ Design work-hours</li> </ul>	<ul style="list-style-type: none"> <li>✓ Lubricant costs</li> <li>✓ Lubricant supply equipment electrical costs</li> <li>✓ Greasing work-hours</li> </ul>

# Liquid Crystal Lubricant Series



CO<sub>2</sub> emissions at procurement **83% reduced** \*Calculated from usage amount ratios



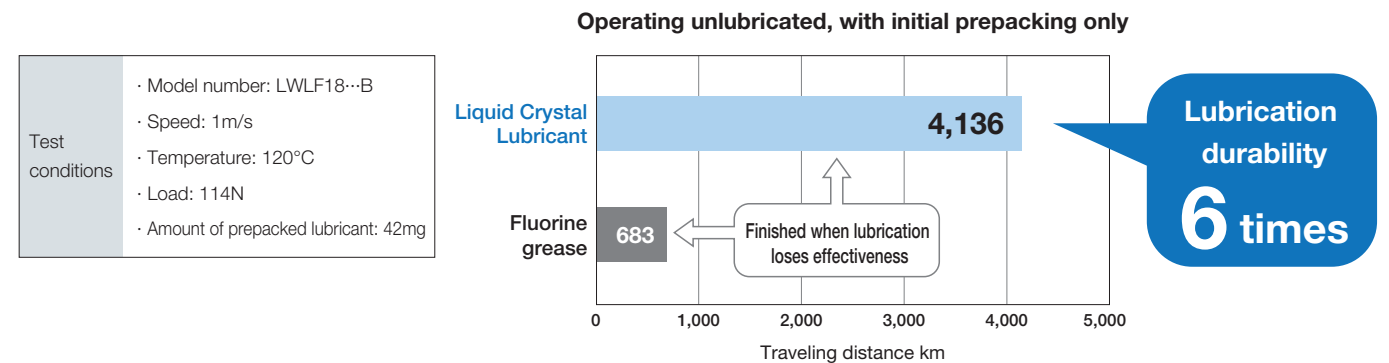
## What is liquid crystal lubricant?

Liquid crystal lubricants are completely different from greases composed of base oils and thickeners. They are a new lubricant composed only of liquid crystal compounds. Superb lubrication durability in special environments enables major reductions in lubricant quantities. Also, the series contributes to the conservation of the global environment, as it contains no organic fluorine compounds (PFAS).



## Superior lubrication durability

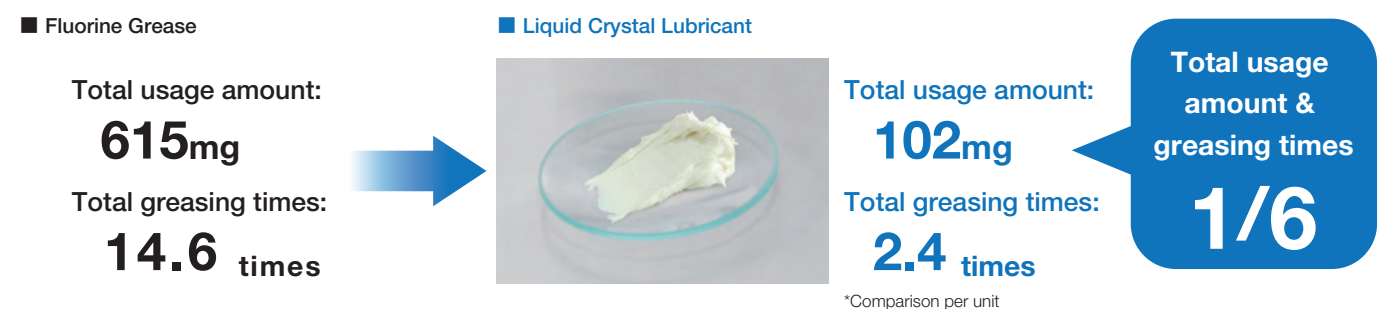
Compared with fluorine grease, liquid crystal lubricant demonstrates excellent lubrication durability even in rolling contact at high surface pressure.




## Lubricant usage amount and greasing work-hours sharply reduced


The excellent lubrication durability of liquid crystal lubricant enables sharply reduced lubricant usage amounts and greasing times compared to fluorine grease.


For traveling distance 10,000km



# Linear Roller Way Series

  
 Compact/lightweight

  
 Low frictional resistance


  
 Long life

CO<sub>2</sub> emissions at transportation: **39% reduced**

CO<sub>2</sub> emissions in use: **40% reduced**

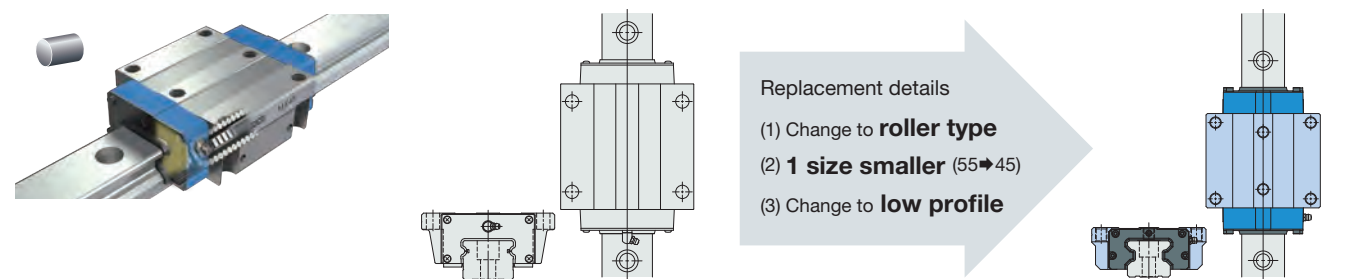
CO<sub>2</sub> emissions at disposal: **28% reduced**

\*Calculated from mass, frictional resistance, and life ratio



Switching from ball type to roller type makes the product more compact and lightweight, lowers its frictional resistance, and extends its life.

## Switch to roller type



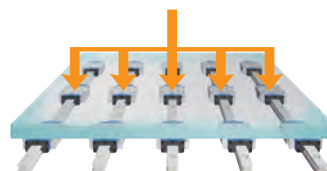
	Ball Type LWH55C2R1000BH	Replacement effect	Roller Type MXN45C2R1000H
Product performance	Calculated life <small>*For applied load 10,000N per slide unit</small>	<b>72,145km</b> (Basic dynamic load rating C: 113,000N)	<b>92,073km</b> (Basic dynamic load rating C: 95,400N)
	Static safety factor <small>*For applied load 10,000N per slide unit</small>	<b>12.1</b> (Basic static load rating Co: 121,000N)	<b>15.9</b> (Basic static load rating Co: 159,000N)
Dimensions of slide unit	Height	<b>70mm</b>	<b>52mm</b>
	Width	<b>140mm</b>	<b>120mm</b>
	Length	<b>183mm</b>	<b>154mm</b>
Mass per 1 set	<b>26.1kg</b>	<b>39% lighter weight!</b>	<b>16.0kg</b>
Frictional resistance <small>*For applied load 10,000N per slide unit *When using median value of each series as friction coefficient</small>	<b>50N</b>	<b>40% lower frictional resistance!</b>	<b>30N</b>

## Interchangeable

Interchangeable refers to compatible specifications which enable free combination and replacement while completely maintaining slide unit and track rail accuracy and preload. Because units and rails can be purchased individually in the quantities needed, this product specification is environmentally friendly, enabling reduction in material waste and excess inventory.

- Accuracy interchangeability
- Unit interchangeability
- Short delivery products

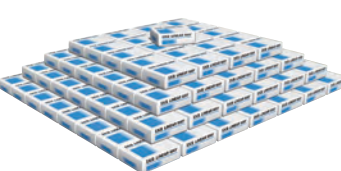
(1) Height variation management maintains high accuracy during multiple unit use!



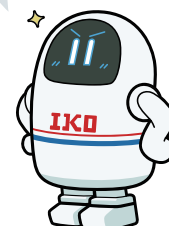
(2) Many models can be freely combined!



(3) Units and rails can be individually purchased as needed in the quantities needed!





- Contributes to
- Waste disposal reduction
  - Assembly work-hour reduction
  - Inventory reduction



# Linear Way Series

## C-Lube Linear Way V MV


  
 Compact/lightweight

  
 Long life

CO<sub>2</sub> emissions at transportation: **33% reduced**

CO<sub>2</sub> emissions at disposal: **82% reduced**

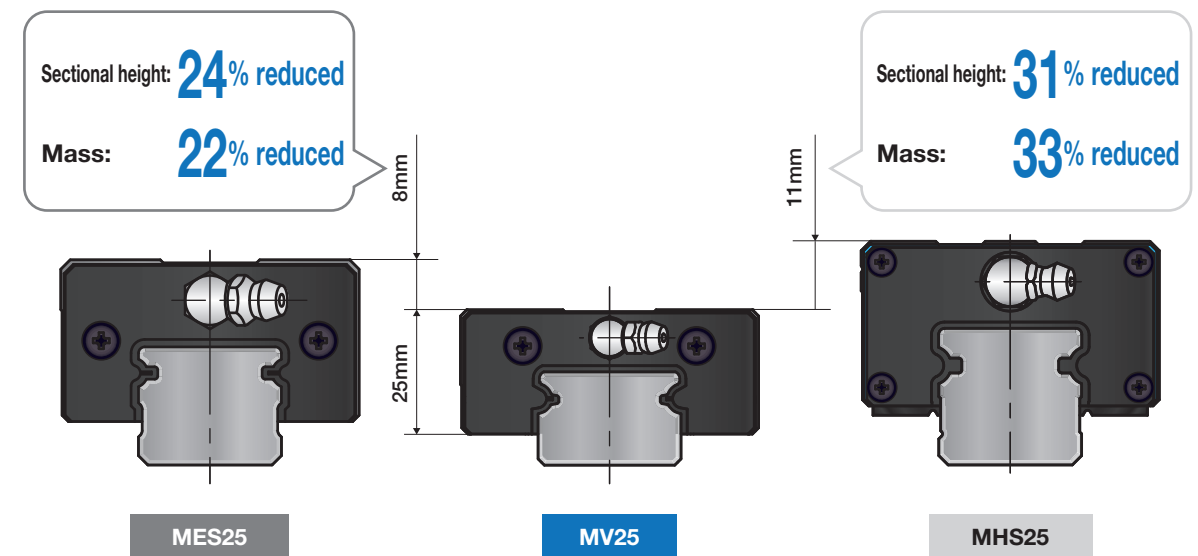
\*Calculated from mass ratio and life ratio



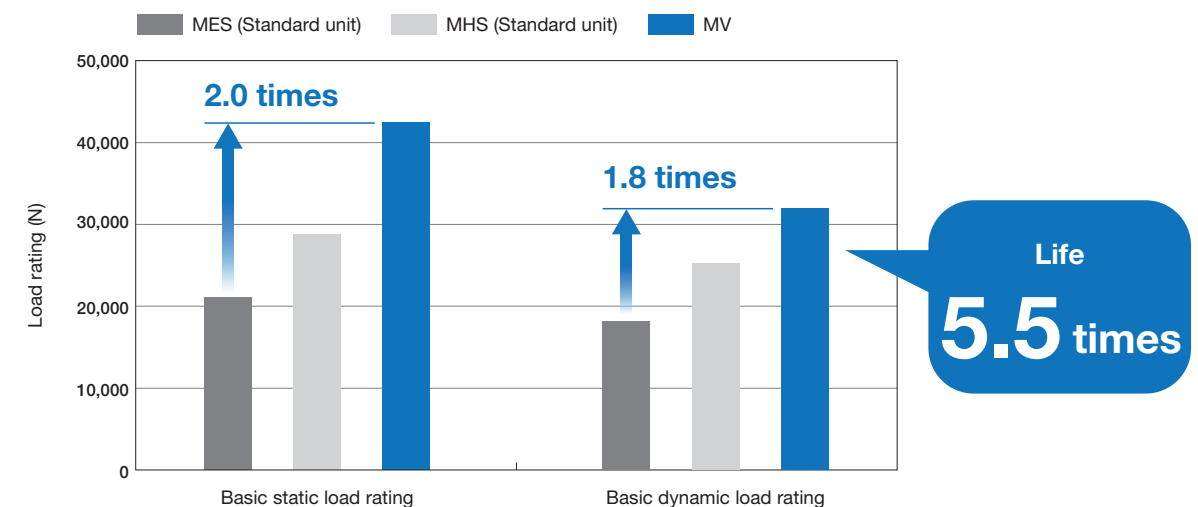


Despite its ultra-low profile and ultra-light weight, it has the maximum downward load rating among ball types, contributing to smaller, longer-lived machines and equipment.

## Ultra-low profile/ultra-lightweight (for size 25, rail 1m, 2 units)



## Downward load rating is the maximum among ball types (for size 25)





# Cam Follower Series

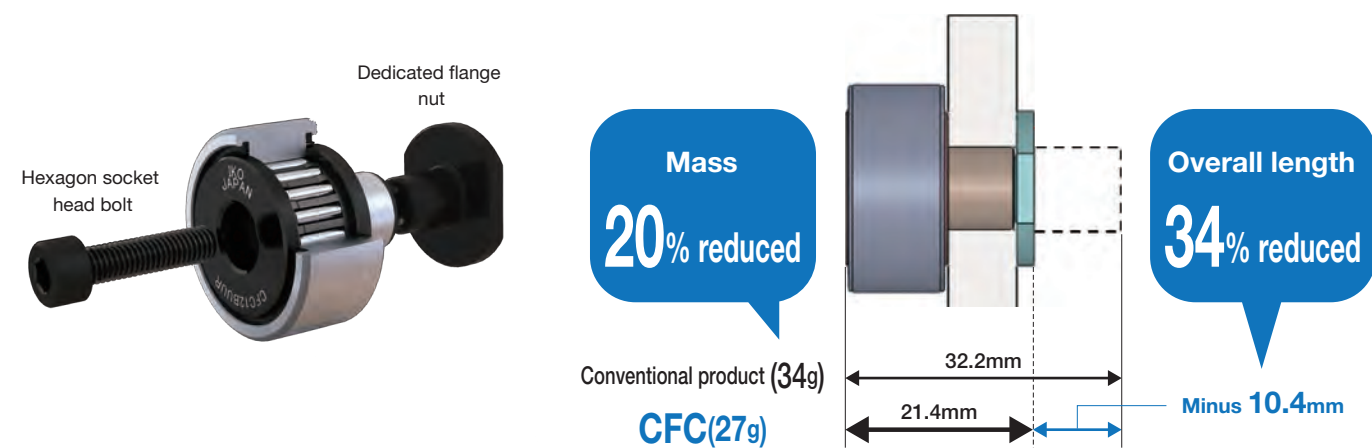
## Short Stud Type Cam Followers CFC...B

**CO<sub>2</sub> emissions at transportation 20% reduced** \*Calculated from mass ratio

**Compact/lightweight**

New mounting structure uses a hexagon socket head bolt and a dedicated flange nut. Significantly reduced mounting space enables greater freedom in design, improving production efficiency.

**More compact and lighter-weight** (for shaft diameter 8mm)



## Cylindrical Roller Cam Followers NUCF

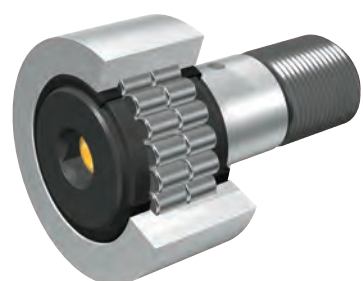
**CO<sub>2</sub> emissions at transportation 11% reduced**

**CO<sub>2</sub> emissions at disposal 9% reduced** \*Calculated from mass ratio and life ratio

**Compact/lightweight** **Long life**

These bearings incorporate double rows of full complement cylindrical rollers and are able to withstand large radial loads. Replacement from Standard Type Cam Followers enables lighter weight and longer life.

**Longer life and more compact** (for shaft diameter 12mm)



Model number	Shaft diameter mm	Basic dynamic load rating C N	Overall length mm	Outside dia. of outer ring mm	Mass g
CF12VBR (Standard)	12	13,500	40.2	30	97
NUCF12BR (Double row)	12	14,000	40.2	30	86

**Life 1.1 times** **Mass 11% reduced**

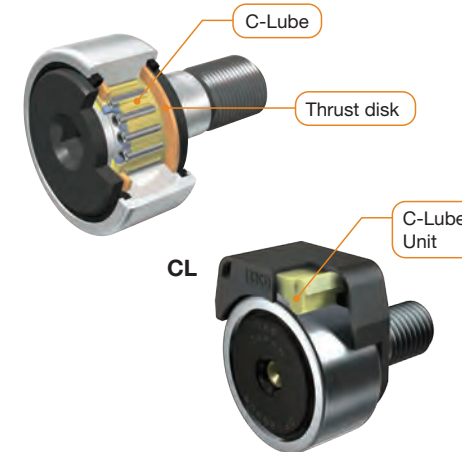
## C-Lube Cam Followers & C-Lube Units

**CO<sub>2</sub> emissions at disposal 73% reduced** \*Calculated from life ratio

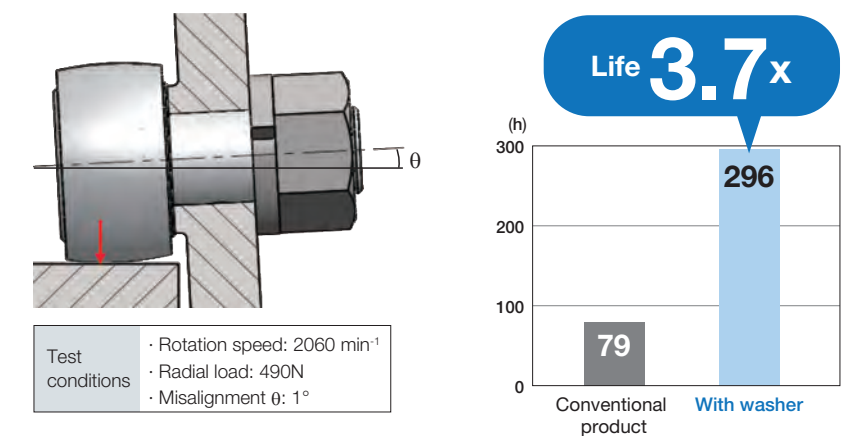
**Long life** **Resource saving**

The combination of C-Lube Cam Followers prepacked with C-Lube within the bearing and C-Lube Units supplying lubrication oil to the outer ring outer diameter enables long-term, maintenance-free use of both the cam follower interior and cam guide surface. C-Lube Cam Followers have thrust washers built in, preventing friction and wear from being generated within the bearings due to mounting errors and thus contributing to longer life.

CF...WB.../SG



**Durability test with mounting error** (for shaft diameter 10mm)



## Cam Followers with Resin CFL

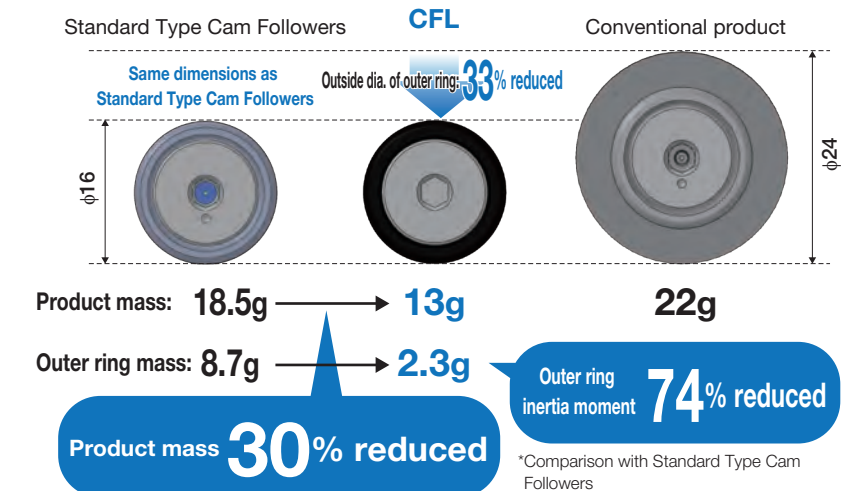
**CO<sub>2</sub> emissions at transportation 30% reduced**

**CO<sub>2</sub> emissions in use 74% reduced** \*Calculated from mass ratio and inertia moment ratio

**Compact/lightweight** **High efficiency**

The use of an outer ring made from integrally molded resin and steel plates realizes smaller size and lighter weight compared to conventional products in which resin is crimped onto the outer ring.

**More compact and lighter-weight** (for shaft diameter 6mm)



# Crossed Roller Bearings Series

## Super Slim Type Crossed Roller Bearings CRBT

**CO<sub>2</sub> emissions at transportation 95% reduced** \*Calculated from mass ratio

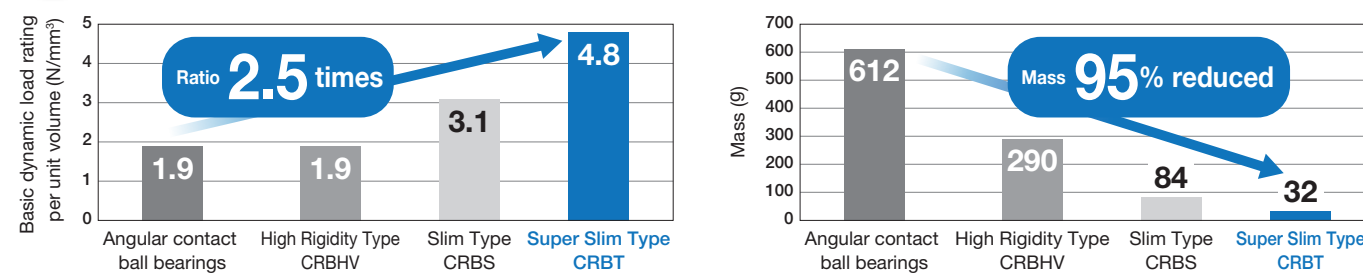
Compact/lightweight

In 2008, we developed CRBT, the world's first Slim Type Crossed Roller Bearing. We are continuing to work to develop high-load capacity, compact bearings.

### Dimensional comparison

Model number	Angular contact ball bearings (Contact angle 30° rear mating)	High Rigidity Type CRBHV5013A	Slim Type CRBS508	Super Slim Type CRBT505A
Bore diameter mm	50	50	50	50
Outer diameter mm	80	80	66	61
Sectional height mm	15	15	8	5.5
Width mm	32	13	8	5
Bearing volume mm <sup>3</sup>	22,608	9,185	1,608	475

### Balances high load capacity & compactness



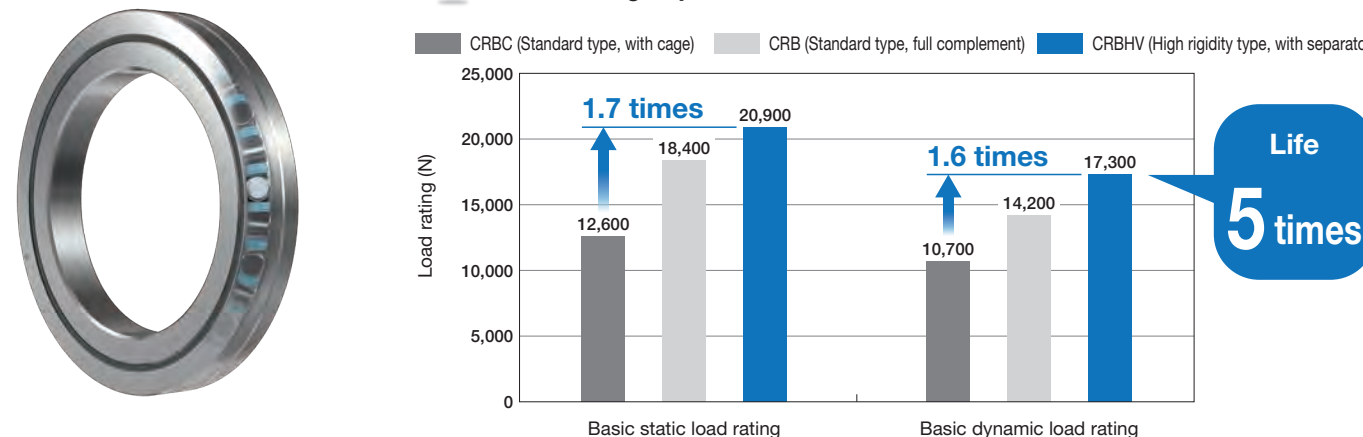
## High Rigidity Type Crossed Roller Bearings V CRBHV

**CO<sub>2</sub> emissions at disposal 80% reduced** \*Calculated from life ratio

Long life

Through the use of an integrated inner-outer ring structure, the High Rigidity Type achieves high load capacity compared to the Standard Type.

### Load rating improvement (for bearings with 50mm bore diameter and 13mm width)



## Mounting Holed Type Super Slim Crossed Roller Bearings CRBTF

**CO<sub>2</sub> emissions at transportation 42% reduced**

**CO<sub>2</sub> emissions in use 43% reduced** \*Calculated from equipment mass ratio and inertia moment ratio

Compact/lightweight High efficiency

CRBTF maintains the 5mm width dimension of the conventional Super Slim Type CRBT while adding mounting holes to the inner and outer rings, allowing it to be directly bolted on to the mating surface. This helps simplify peripheral parts and contributes to further compactness in equipment.

**More compact equipment**

		Conventional product CRBT	CRBTF
Bearings	Bore diameter mm	40	40
	Outer diameter mm	51	73
	Sectional height mm	5.5	16.5
	Width mm	5	5
	Mass g	32.3	103
Equipment	Mass g	856	589

Equipment mass **42% reduced**

Outer ring inertia moment **43% reduced**

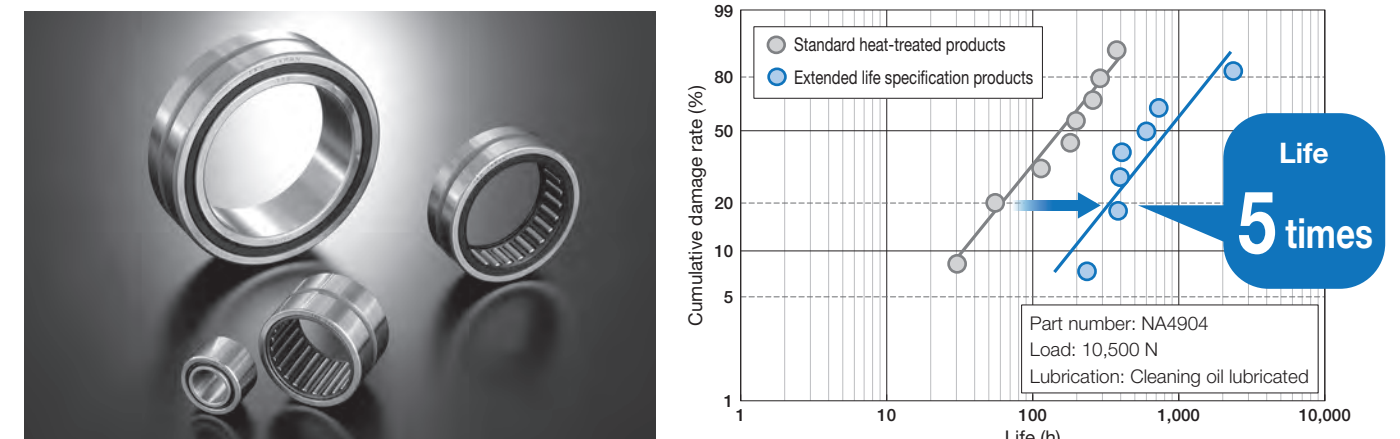
# Needle Roller Bearing Series

## Extended Life Specification Machined Type Needle Roller Bearings

**CO<sub>2</sub> emissions at disposal 80% reduced** \*Calculated from life ratio

Long life

The long life specification uses a special heat treatment to enhance the hardness and toughness of the bearing surface layer, which suppresses the occurrence and progress of damage that starts from the surface. Therefore, it achieves a significant life extension under severe load conditions and in lubricated environments where there is intrusion of foreign substances.





# Alignment Stage SA...DE

SA...DE is a compact, high-accuracy alignment stage utilizing a direct drive system. An X-table for linear motion and a  $\theta$ -table serving as the rotary positioning section can be freely combined.



## XY-table

Compact/lightweight

High efficiency

CO<sub>2</sub> emissions at transportation

**18% reduced**

CO<sub>2</sub> emissions in use

**50% reduced**

\*Calculated from mass ratio and rated thrust

SA200DE/XY

**More compact**

Sectional height **25% reduced**

Mass **18% reduced**

20mm lower profile

Conventional product (17.5kg) - 3.1kg lighter weight → High-functioning model (14.4kg)

## Improved thrust force

**Rated thrust**

Conventional product: 35N  
New Product: 70N

**Maximum thrust**

Conventional product: 270N  
New Product: 400N

## $\theta$ -table

High efficiency

CO<sub>2</sub> emissions in use

**42% reduced**

\*Calculated from power consumption ratio

SA200DE/S

**Improved torque**

**Rated torque**

Conventional product: 1.2 Nm  
New Product: 2.0 Nm

**Maximum torque**

Conventional product: 4.0 Nm  
New Product: 8.0 Nm

## Low power, high tact

**Power consumption under same cycle conditions**

Conventional product: 128.6 Wh  
High-functioning model: 74.4 Wh

**1 cycle time under same power consumption conditions**

Conventional product: 0.2 s  
High-functioning model: 0.145 s

**Test conditions**

- Carrying mass: 10kg
- Operation velocity: 80deg/s

# CO<sub>2</sub> Reduction Targets and Results

In order to evaluate and manage the effects of climate-related issues on our management, the **IKO** Group calculates greenhouse gas emissions quantities based on the GHG Protocol standards. Our Group's fiscal 2022 CO<sub>2</sub> emissions quantities (Scope 1, 2) were 32,130t-CO<sub>2</sub>, a 3.3% reduction from the previous year. We intend to continue reinforcing our emissions reduction initiatives to work toward realizing carbon neutrality in 2050.

### Targets

FY2030 (mid-term target)

Reduction of NIPPON THOMPSON CO., LTD. individual Scope 1, 2 emissions quantities by **50% or more** (compared to FY2018)

FY2018 emissions quantities: 21,704t-CO<sub>2</sub>

FY2050 (long-term target)

Realizing carbon neutrality

### Results

Greenhouse gas emissions quantities (Scope 1, 2, 3)

FY2022 total emissions 360,000t-CO<sub>2</sub>

Trends in Scope 1, 2 emissions quantities (individual, overseas production division)

(t-CO<sub>2</sub>)

Legend: NIPPON THOMPSON CO., LTD. (Japan), ITV (Vietnam), UBC Suzhou (China), Sales basic unit (t-CO<sub>2</sub>/million yen)

\*For details, see "Information disclosure based on TCFD recommendations."  
<https://www.ikont.co.jp/eg/sustainability/warming.html>

- **Scope 1** ... Direct emissions of greenhouse gases from business itself
- **Scope 2** ... Indirect emissions accompanying use of electricity, heat, or steam from other companies
- **Scope 3** ... Indirect emissions other than those in Scope 1 and Scope 2; emissions from other companies related to the business owner's activities

11

12



Energy saving

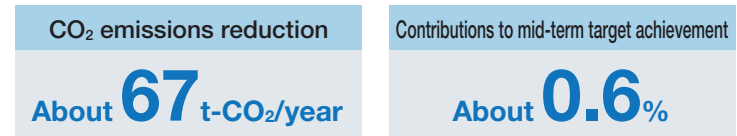
## Energy Saving Measures

Below are examples of initiatives that contribute toward our energy saving goals.

### Promoting energy saving activities from various sources

#### 1 Adoption of LED lighting

We have actively adopted LED lighting, supporting longer life and saving energy. In addition, when replacing office lighting, we have mounted hand-level switches, allowing individual workers to contribute to saving energy while raising their awareness.



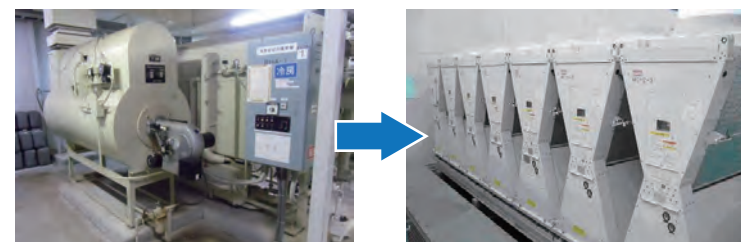
Hf lighting

LED lighting

Hand-level switch

#### 2 Switching from heavy oil fuels to electrical HVAC facilities

HVAC facilities that use heavy oil as a heat source can cause various problems such as the risk of atmospheric pollution; therefore, we are switching to electrical facilities with higher energy efficiency when renovation periods come due. By controlling a combination of partial load operation, which efficiently produces the required capacity, we further enhance energy efficiency.

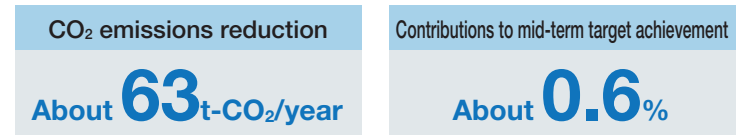
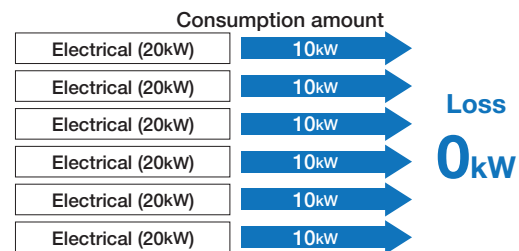
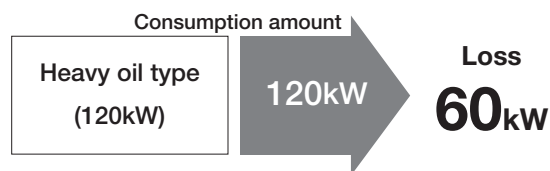


Oil-fired absorption chiller

Electrical heat pump chiller

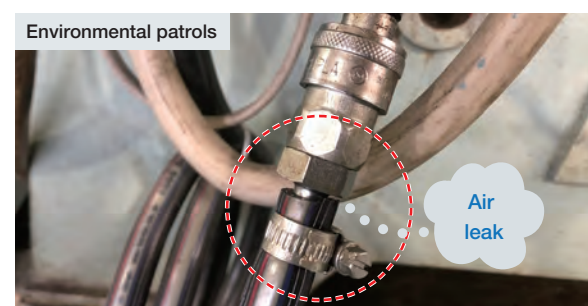
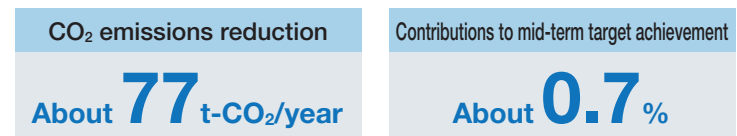
#### Visualized Renewable Energy Effects

(at required power 60kW)



#### 3 Implementation plan and progress monitoring

Planning environmental initiatives within all divisions as the Environmental Committee monitors progress, we are moving forward with renewable energy activities. Through various approaches such as energy saving patrols and machining process reviews, in addition to 1 and 2 above, our plants have reduced emissions by approximately 773t-CO<sub>2</sub> over the decade since 2013.



Environmental patrols

Air leak



Renewable energy

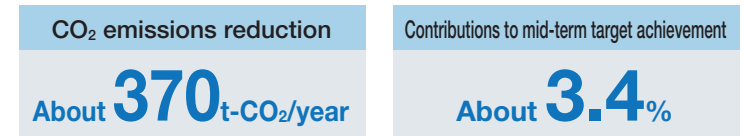
## Procurement of Renewable Energy

We have also taken on new initiatives as an industry pioneer to achieve carbon neutrality.

### Introduction of two types of solar power

#### 4 Onsite PPA

Onsite PPA means having a power company install solar power facilities within our own company property, as a contract model in which the business owner consumes the generated CO<sub>2</sub>-free power. IKO has introduced this model at our Gokurakuji and Mugegawa sites.

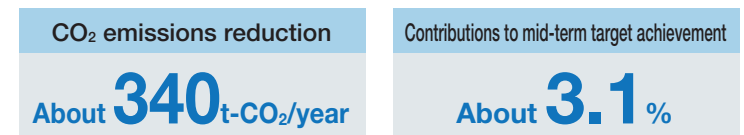
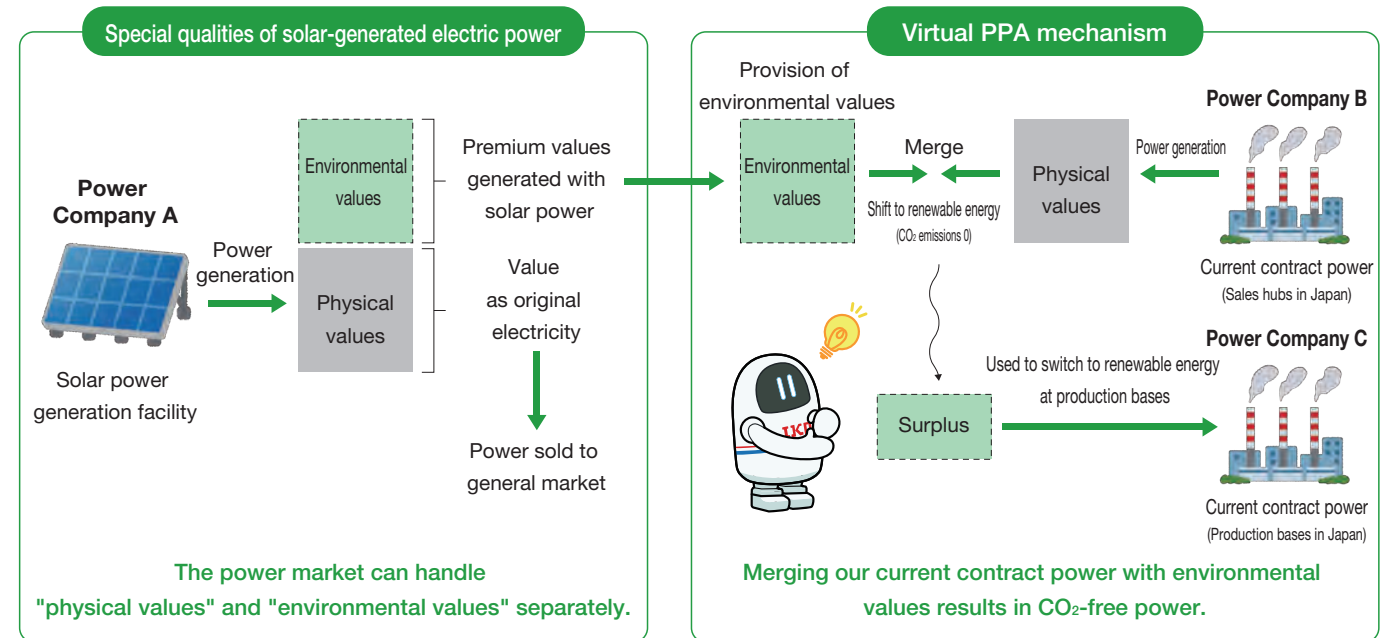


Gokurakuji district (operating as of 2021)

Mugegawa district (operating as of 2023)

#### 5 Off-site virtual PPA **First in the Japanese bearings industry** **Electric power at sales hubs in Japan using 100% renewable energy**

Off-site virtual PPA means that the power company installs solar power facilities outside our own company property, as a contract model in which they provide the business owner only with the environmental values of the generated CO<sub>2</sub>-free power. This approach has realized 100% renewable energy use in the electric power used at sales hubs in Japan. The surplus is put to use toward switching to renewable energy in electric power used at production bases in Japan.



#### Contributions to mid-term target achievement \*Calculation as of September 2023

Through initiatives 1 to 5, we expect to achieve an **approximate 8.4%** reduction effect of our 2030 reduction target, 10,852t-CO<sub>2</sub>.

We plan to keep our initiatives moving forward in order to enhance their CO<sub>2</sub> emissions reduction effects.

