

Grease Replenishing System for High-Speed Spindles

Fine-Lub II

Faster and firmer, with improved comfort.
A new system that dramatically increases
grease lubrication performance.

A World
First

Patented



CLEAN LINES

Machine tools should require less maintenance, allowing around-the-clock use. Working conditions should be safe and comfortable for people on the job.

Redesigning the spindle lubrication system makes it all possible.

The world's first system to convert the high-speed spindles of machining tools from oil lubrication to grease lubrication ensures cleanliness, saves energy and provides more than 10 000 hours of maintenance-free performance.

Until recently, high-speed spindles have used oil-air or oil-mist lubrication. Current worldwide concern for the environment requires a new system that reduces noise and oil mist while supporting clean working conditions and energy efficiency. In response to this demand, NSK has developed Fine-Lub II, the world's first grease replenishing system for high-speed machining tool spindles. Fine-Lub II utilizes an external control device to feed grease into bearings at regular intervals, enabling more than 10 000 hours of maintenance-free performance at maximum continuous rotation speed. In addition to saving energy and providing a cleaner working environment, Fine-Lub II also increases the operating life of grease. NSK's new technology unites the spirit of innovation with concern for the environment and humane working conditions.

Advantages of the Fine-Lub II System

High-speed, long-life performance through grease lubrication

Fine-Lub II provides grease lubrication for high-speed spindles that formerly used oil-air or oil-mist lubrication systems. Fine-Lub II can provide more than 10 000 hours of maintenance-free performance, even for BT40 machining centers continuously operating at 20 000 min⁻¹. The new system dramatically boosts grease lubrication reliability by feeding grease at regular intervals.

Clean working conditions

The new system helps maintain clean, environmentally safe working conditions; oil mist is no longer released into the air.

Low noise

Unlike oil-air lubrication, Fine-Lub II does not require constant air feeding and thereby eliminates irritating wind noise, reducing it by 3 to 5 dB at 20 000 min⁻¹, compared with oil-air lubrication.

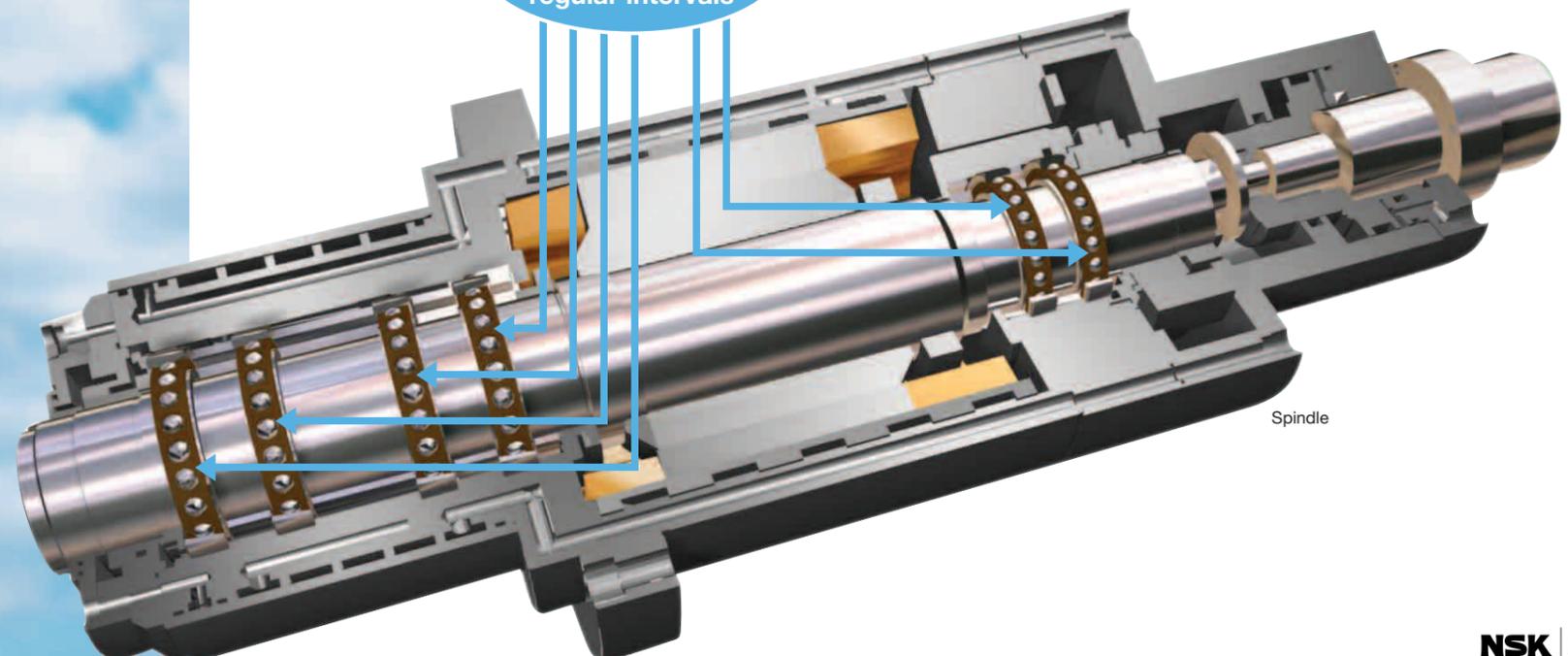
Energy savings

Unlike oil-air lubrication, Fine-Lub II does not require constant air feeding. Air for piston drives is only fed at regular intervals for significantly reduced machinery operating cost and substantial energy savings.



Fine-Lub II

Feeds grease into bearings at regular intervals



Spindle

TECHNOLOGY

High-speed spindles that formerly used oil can now use grease.

NSK's proven expertise makes it possible.

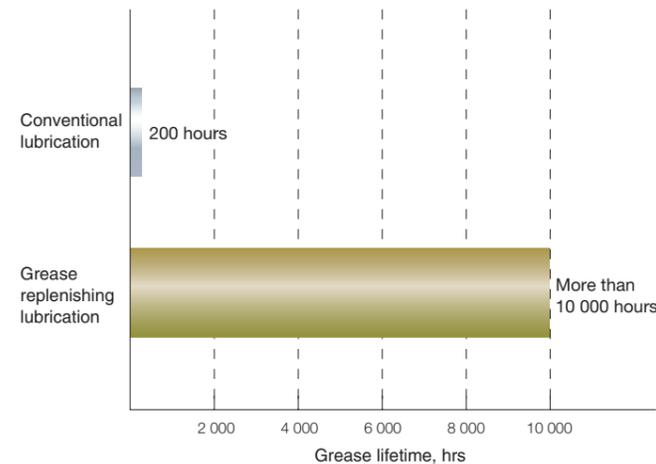
Fine-Lub II provides grease lubrication for high-speed spindles and increases lubrication reliability. NSK technology leads a new era in lubrication.

Fine-Lub II feeds a small amount of grease into high-speed rotating bearings at regular intervals and discharges old grease through an optimally shaped spacer to a grease storage tank located in the housing. This technology delivers the world's first grease lubrication system for the high-speed spindles of machining tools, while at the same time, increases the operating lifetime of grease. This revolutionary product completely transforms the perception of grease lubrication. Fine-Lub II leads a new era in grease lubrication, making it faster and firmer, with improved comfort.

Realizing grease lubrication with longer operating life

The operating lifetime of grease is several hundred hours during continuous rotation at a speed of $1.8M d_m n$ (#40 20 000 min⁻¹). Fine-Lub II was developed with the goal of feeding in an appropriate amount of grease—according to rotation speed and bearing size—to avoid seizing, thereby ensuring more than 10 000 hours of maintenance-free performance.

• Comparison of grease lifetime

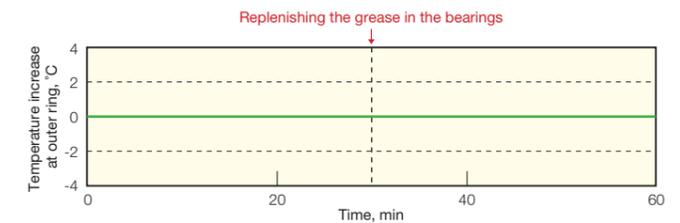


* Operation in excess of 10 000 hours at a speed of $1.8M d_m n$ is equivalent to more than five years of machinery durability.

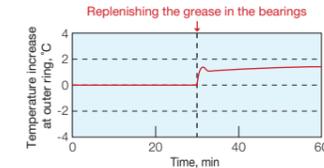
Preventing temperature rise associated with the discharge of lubrication by controlling the amount of grease

Feeding too much grease into the inside of a bearing can cause temperature rise by grease churning. To prevent this, Fine-Lub II features a built-in device to ensure an appropriate amount of grease is discharged.

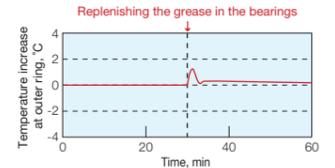
• 0.02 cc of replenishing grease



• 0.30 cc of replenishing grease (2% of spatial volume)

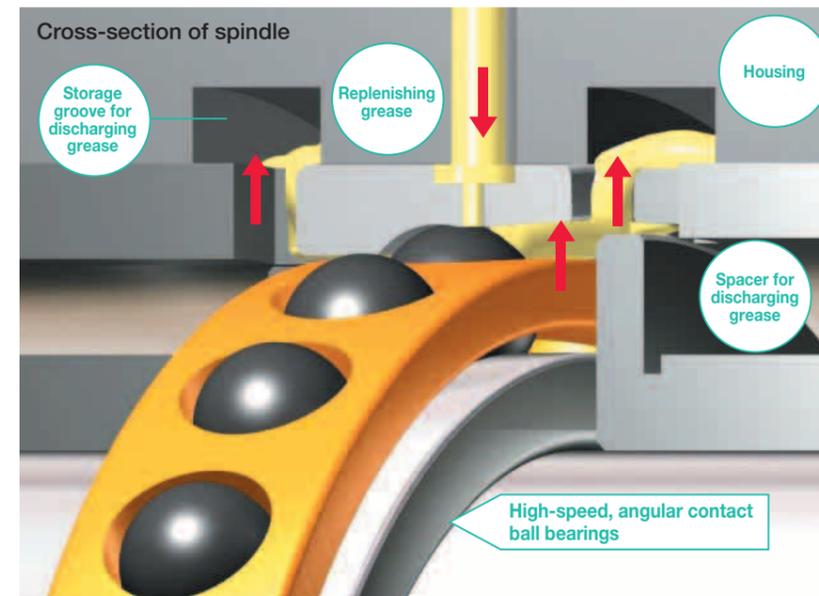


• 0.15 cc of replenishing grease (1% of spatial volume)



<Test conditions:>
 Bearing Number: 65BNR10HTDB Preload in mounted condition: 320N (with position preload)
 Belt-driven rotation speed: 22 000 min⁻¹ ($d_m n$ 1.8M) Housing was not cooled

The Structure for Feeding Grease to Bearings



Bearing shape designed specifically for grease replenishing

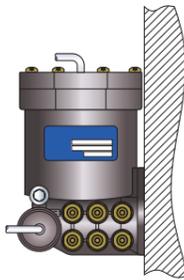
• Grease replenishing method
 A small amount of grease is fed into a spinning bearing, at regular intervals, through a grease inlet located near the outer ring raceway. The grease feed is controlled in small amounts to prevent temperature rise of the bearing.

• Grease discharging method
 A specially shaped spacer for grease discharge, located at the counter-bore side, directs old grease into a storage race, preventing it from re-entering the inside of the bearing.

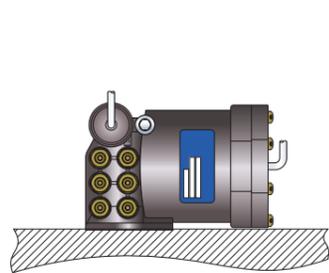
How to set up Fine-Lub II

The Fine-Lub II grease replenishing system is designed to allow freedom of configuration, vertically or horizontally, anywhere.

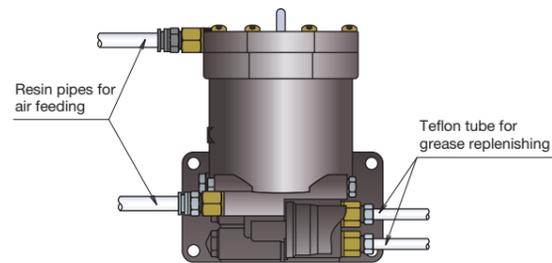
Vertical position



Horizontal position



Piping layout



MTE grease for machining tools



The MTE grease, which is sealed within the Fine-Lub II, was originally developed by NSK for high-speed, heavy load applications and is used extensively in machining tools. Due to the lower degree of isolation of the base oil, MTE grease is ideal for pressure-feed replenishing.

Allows replenishment of grease



Fine-Lub II can be used continuously by replenishing its MTE grease (sold separately).

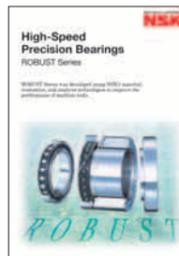
Optional parts

Parts No.	Specifications
GREASE-MTE 100G	MTE grease (100 g)
EGJ-01	Male/female joint for grease replenishing

ROBUST Series spindle bearings: high-speed precision specially designed for Fine-Lub II

The ROBUST Series bearings realize long life through special grease replenishing features

To realize high-speed, life-long grease lubrication, the low heat generating ROBUST Series bearings incorporate a grease replenishing system that provides a grease inlet at an optimal position on the outer ring. Unlike oil-air lubrication, phasing work and O-rings are not necessary.



For more details, please refer to the ROBUST Series catalogue No. E1257.

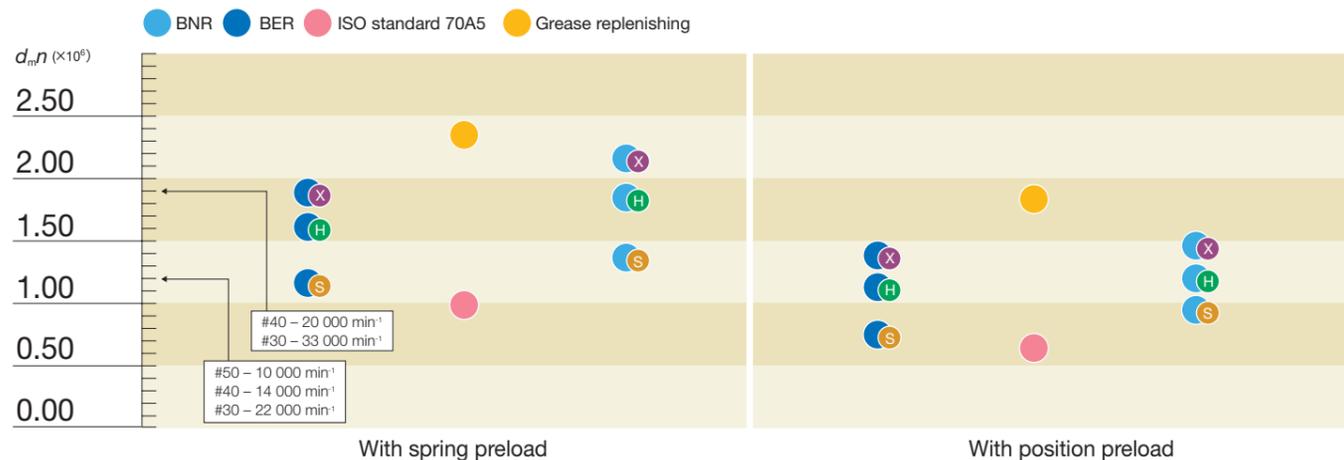


Bearing specifically designed for grease lubrication



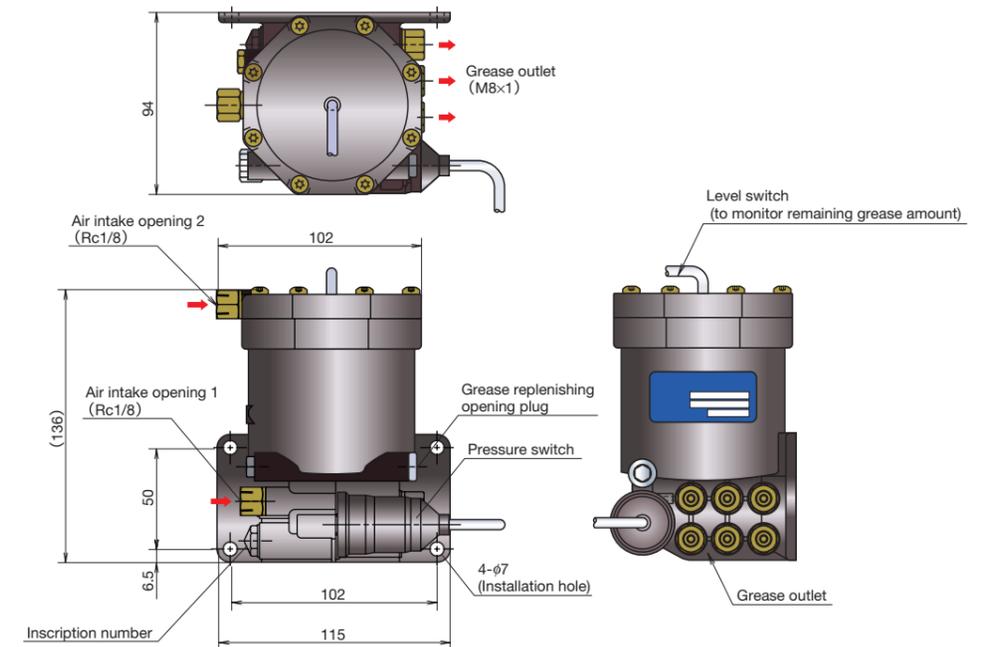
• Selection guide for bearings with grease lubrication

Bearing types are based on preload method and rotational speed.



* Assuming #50 taper - Bearing Bore = 100 mm; #40 taper - Bearing Bore = 70 mm; #30 taper - Bearing Bore = 40 mm

Dimensions



Model Number

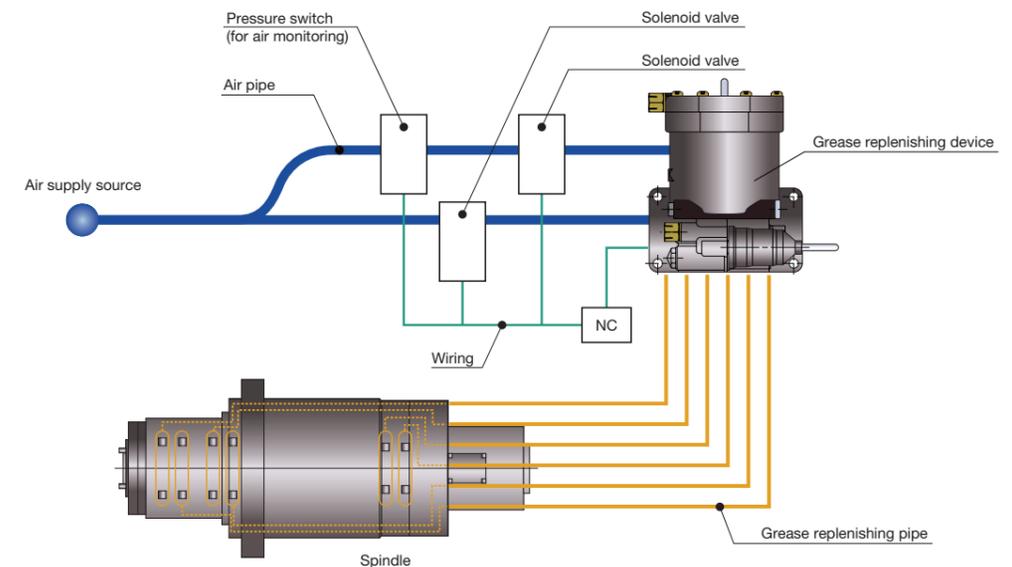
EGU	-	2P1	-	4P2
		Two P1 ports		Four P2 ports
EGU	-	6P1		
		Six P1 ports		

Discharge amount (cc/cycle)	Code number
0.01	P1
0.02	P2

Fine-Lub II Specifications

Item	Specification
Air feeding pressure	0.25 to 0.4 MPa
Discharge amount	0.01 or 0.02/bearing in a row
Tank capacity	200 cc
Monitoring function	Detection of remaining grease amount, detection of pressure (check of pressure increase)
Pipe length	2.5 m or less
Sealed-in grease	MTE grease

System Diagram



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