

Lubrication unit NSK K1™ technical sheet

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NSK K1™ TECHNICAL SHEET <AUTOMOTIVE MANUFACTURING EQUIPMENT>

Maintenance free "Long Life even in Severe Environments"

Actual results from welding machines, the most severe environment in automotive plants

Operating conditions

Product: LH300200EL1- PCZZ (Fluorinated black chrome plating)

- Sample No.1: Double seal+Protector (no NSK K1)
- Sample No.2: NSK K1 attached+Single seal+Protector

Tested on the same welding machine at the same place in automotive production line

- Sample No.1: 10.5 months operation
- Sample No.2: 13 months operation

Ball deterioration

Sample No.1
(without NSK K1)



Sample No.2
(with NSK K1)



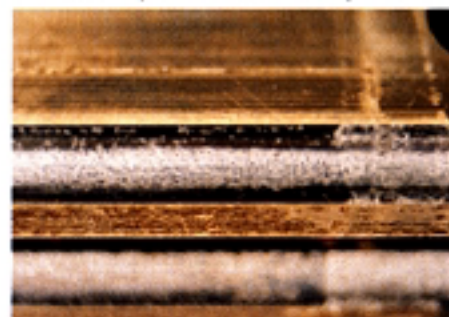
Comparison after running

Sample No.1: Rail and ball slide raceways and balls showed rust and extensive deterioration

Sample No.2: Rail and ball slide raceways and balls had no rust and only slight deterioration

Rail raceway deterioration

Sample No.1
(without NSK K1)



Sample No.2
(with NSK K1)



NSK K1™ TECHNICAL SHEET <AUTOMOTIVE MANUFACTURING EQUIPMENT>

Proposal for Cost Reduction for Automotive Manufacturing Plants

Merit

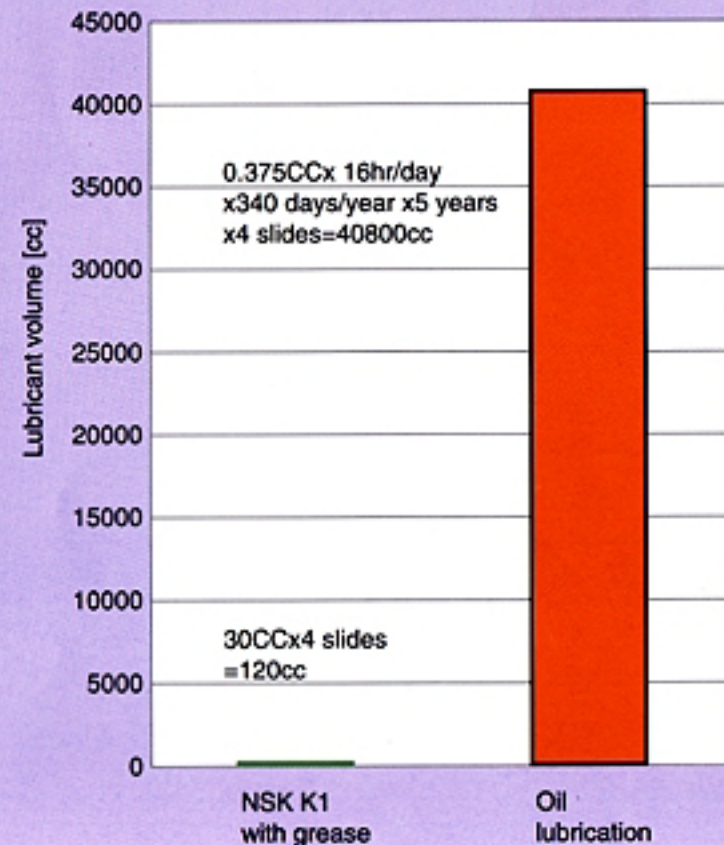
- Reduced expense for lubricants (see graph in the right)
- No oil or grease supply systems required
 - > Reduced equipment cost
- Improved machine design time and efficiency
 - > No piping design required
- Better for the environment
 - > NSK K1 reduces lubricant consumption, minimizes waste oil

Applications

- Lifter & Carrier
- Part storage & retrieval equipment
- Engine chassis decking equipment
- Under body welding machines
- Body line conveyors
- Identification stamping machine
- Conveyor systems
- Sorting equipment
- Vibration testers
- Assembly machines
- Differential gear grinders

Comparison of lubricant consumption

Estimated oil consumption in the test equivalent to 5 years running (for 4 LH45 sliders)



NSK K1™ TECHNICAL SHEET <MACHINE TOOL>

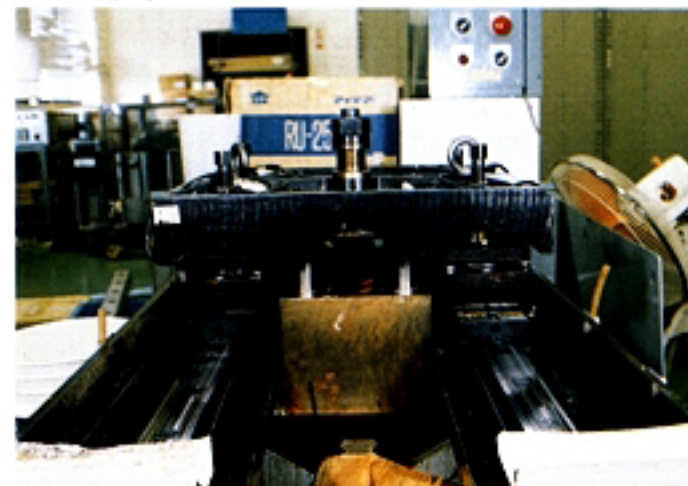
High Load Life Test Using Cutting Coolant which is Contaminated with Cast Iron Particles

Product LY45BNZ4 (3 samples of different lubricant conditions)

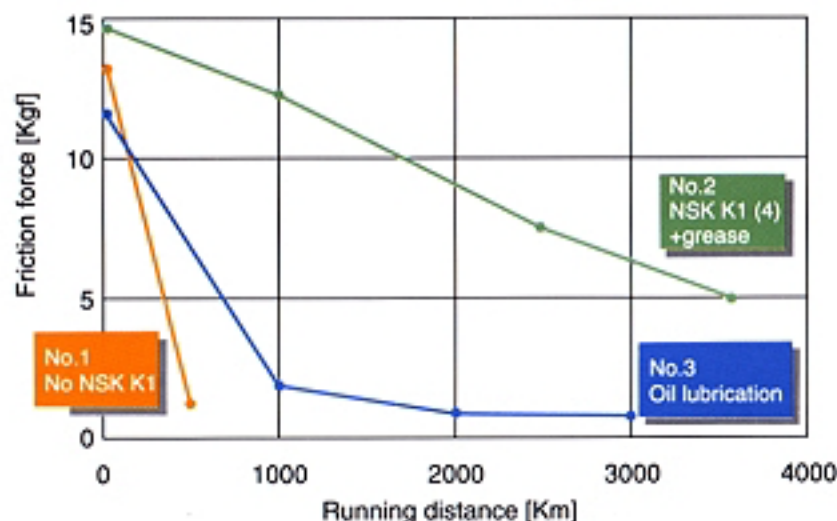
Test conditions

- **Load** 1000kgf per one ball slide
- **Preload** 420kgf
- **Feed** average 24m/min
- **Contamination** Coolant "MICROCUT 3850LH" dilution 30:1 FCD45 particles 115 MESH (<125μm) added at 5% (by weight)
- **Pattern** 2 days in coolant (ball grooves of rail are immersed)
5 days no coolant
- **Grease** AV2
- **stroke** 400mm

Test equipment



Frictional force change



Test results

Sample	Lubricating condition	Condition			Result Distance [Km], Running year [*2]
		Broken endcap	Flaking	Lost Preload	
No.1	Grease only	Yes Test stopped	No	Yes	End cap broke prematurely due to inadequate way of lubrication and particles. 600Km, 0.8 years.
No.2	NSK K1 (4pcs.) +Grease	No	No	No	Running uninterrupted over 3600Km, 5 years.
No.3	Oil only	No	Slight	Yes	Shortened life because of particle and inadequate way of lubrication. 3000Km, 4.1 years.

(*1): No replenishment of grease to sample No.1, No.2 during test.

(*2): Running year is calculated by 720km/year (average 3m/min x 16hr/day x 250days/year).

NSK K1™ TECHNICAL SHEET <MACHINE TOOL>

Merit

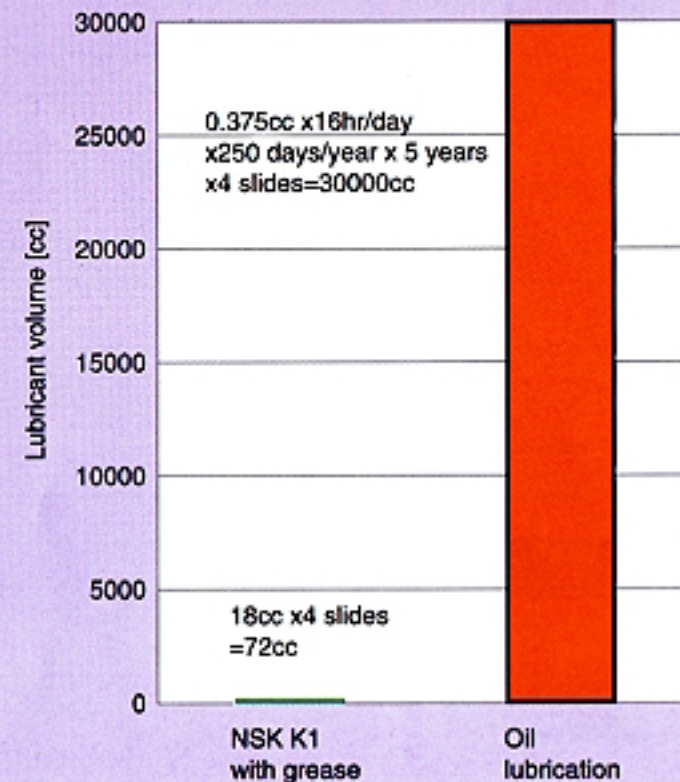
- Reduced expense for lubricants (see graph in the right)
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- Improved machine design time and efficiency
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 - > NSK K1 reduces lubricant consumption, minimized waste oil

Applications

- Machine Tools and related equipment
- Horizontal M/C telescopic cover
- Laser cutting machine (X, Y axis)
- Pallet changer
- Water jet machine

Comparison of lubricant consumption

Estimated oil consumption in the test equivalent to 5 years running (for 4 LY45 sliders)



NSK K1™ TECHNICAL SHEET <WOODWORKING MACHINES>

Long Life even with Wood Chip Contamination

Life is 2 times longer than standard double seals in woodworking machines

Comparison test between NSK K1 and standard double seal

Test conditions

Product: LH30AN (Preload Z1)

Feed rate: 20m/min

Stroke: 400mm

Lubrication: Standard double seal...AV2 grease

NSK K1 NSK K1+AV2 grease

Load: 490N per one ball slide

Wood chip contamination: Set the product in the box with bottom area A, then put 240g of wood chips on the rails. Put back removed wood chips to rails 3 times/day.

[High volume of chips]: A=145mm (width) x 700mm (length)

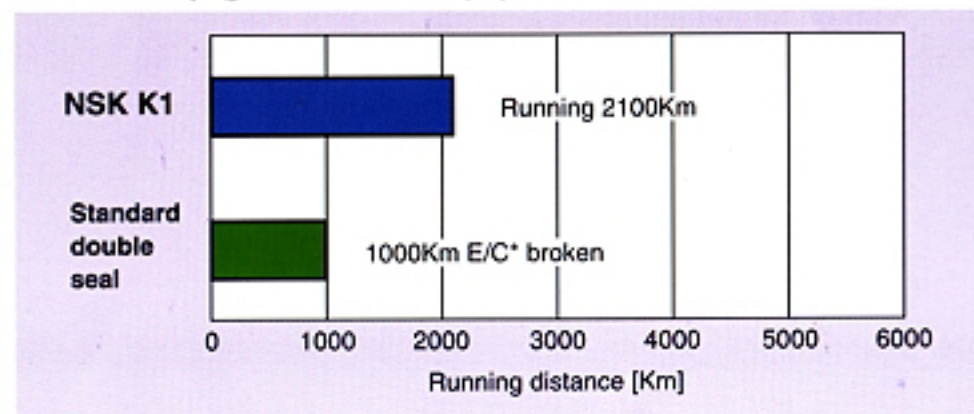
[Medium volume of chips]: A=170mm (width) x 700mm (length)

Running test in wood chips

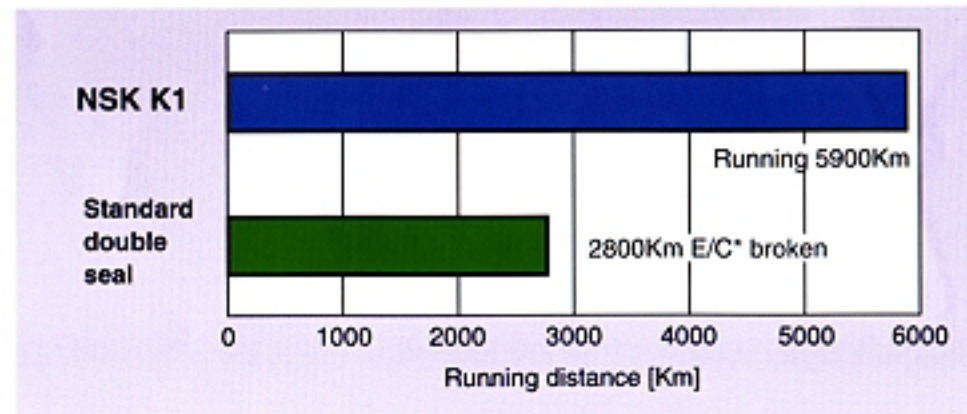


Wood chips

Test results (high volume of chips)



Test results (medium volume of chips)



*E/C: End cap (ball circulating part of Linear guide)

NSK K1™ TECHNICAL SHEET <WOODWORKING MACHINES>

Merit

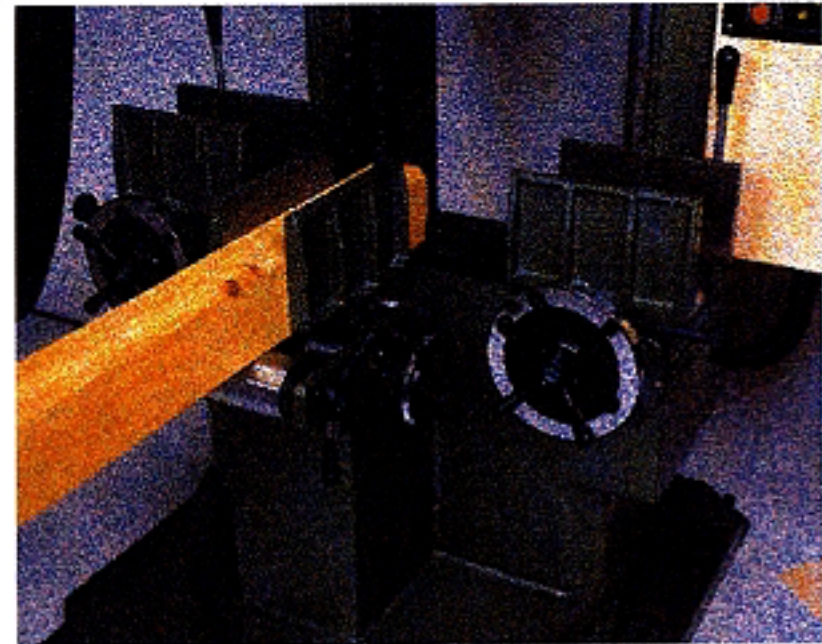
- No oil or grease supply systems required
 - > Reduced equipment cost
- Improved machine design time and efficiency
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- Better for the environment
 - > NSK K1 reduces lubricant consumption, minimizes waste oil

Applications

Wood working/Lumber industry/Carpentry equipment

- Router
- Sawing/Milling
- Precut M/C
- Automatic lumber cutting machine

Lumber cutting machine

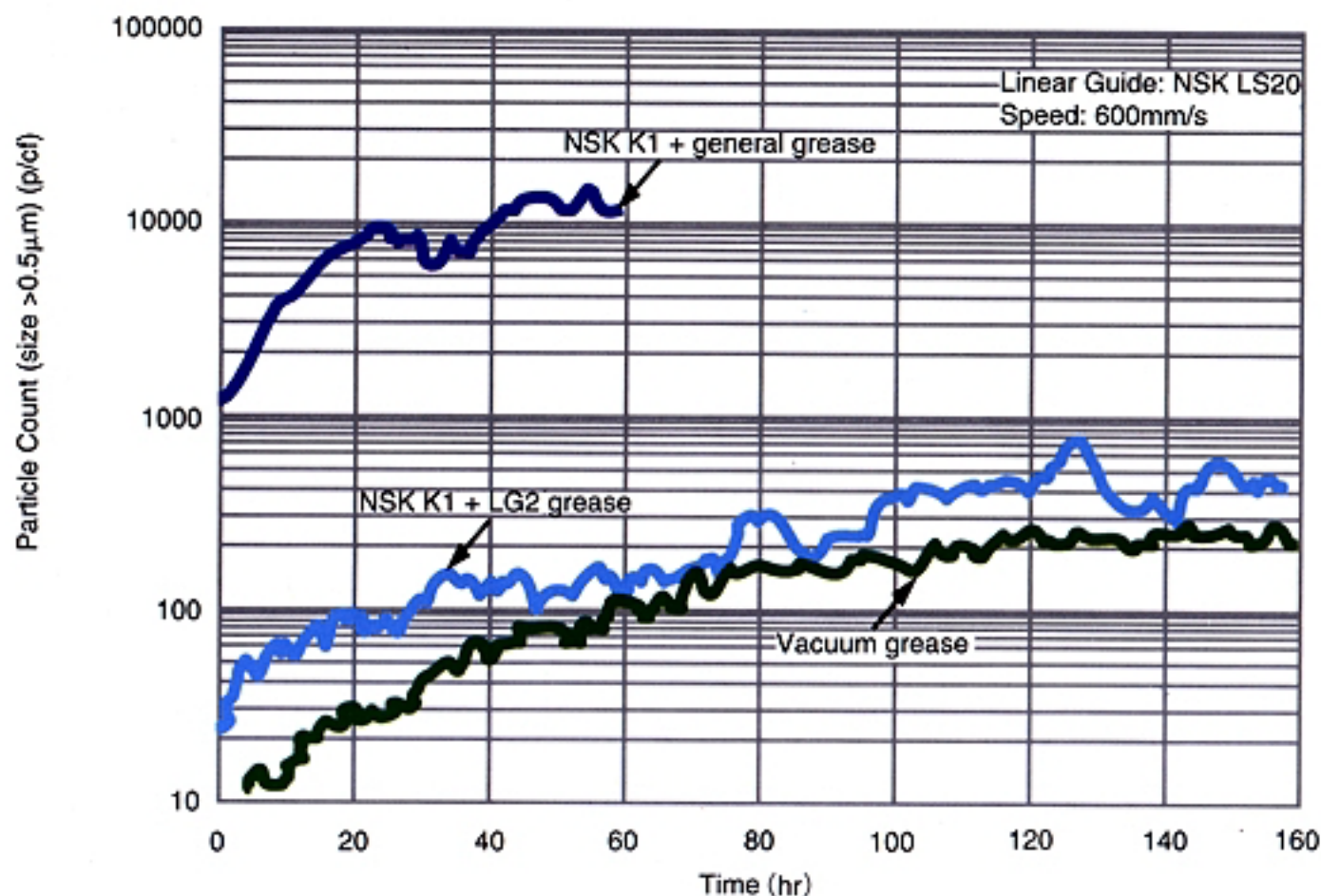


NSK K1™ TECHNICAL SHEET <SEMICONDUCTOR and LCD MANUFACTURING EQUIPMENT>

Low Particle Emission

Combining the NSK K1 with LG2 grease for low particle emission is comparable to using vacuum grease.

Comparison of Particle Emission Characteristics

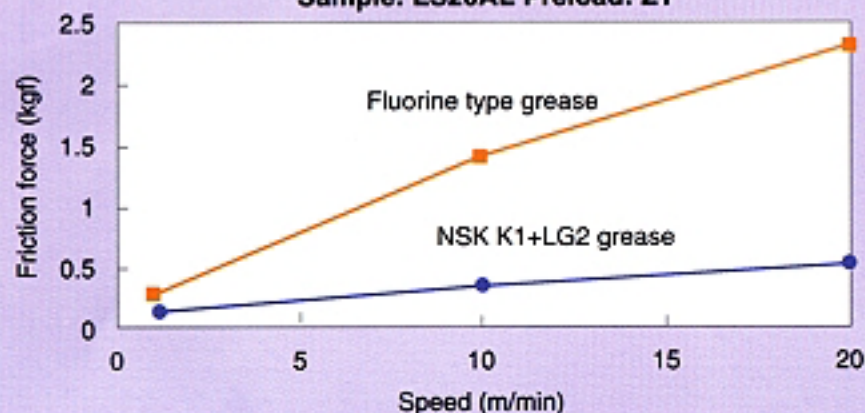


NSK K1™ TECHNICAL SHEET <SEMICONDUCTOR and LCD MANUFACTURING EQUIPMENT>

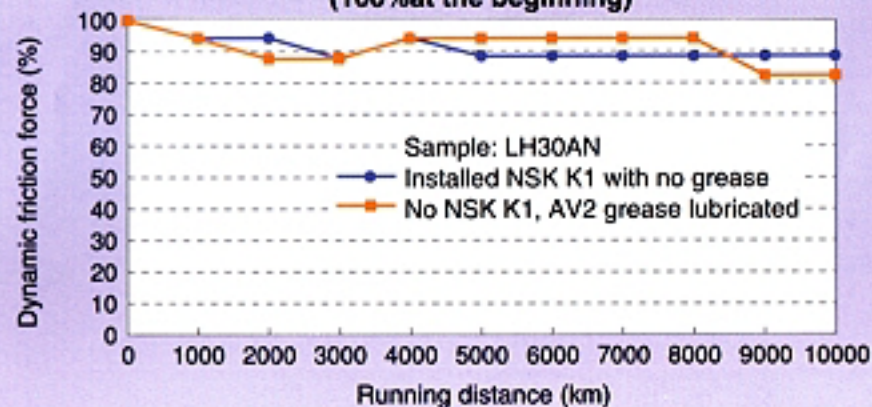
Good Operability (Stable Dynamic Friction Force)

Dynamic friction force is 1/3 to fluorine type grease (at 20m/min).

Dynamic friction force
Sample: LS20AL Preload: Z1



Dynamic friction force change
(100% at the beginning)



High Performance Lubrication – Maintenance free

Over 25,000km running with only NSK K1

Endurance Test without Additional Lubrication

Test conditions

Sample: LH30AN

Preload: Z1, Z3

(High speed test)

(Moderate speed test)

Speed: 200m/min

Speed: 60m/min

Stroke: 1800mm

Stroke: 750mm

Load: 63N/1 ball slide

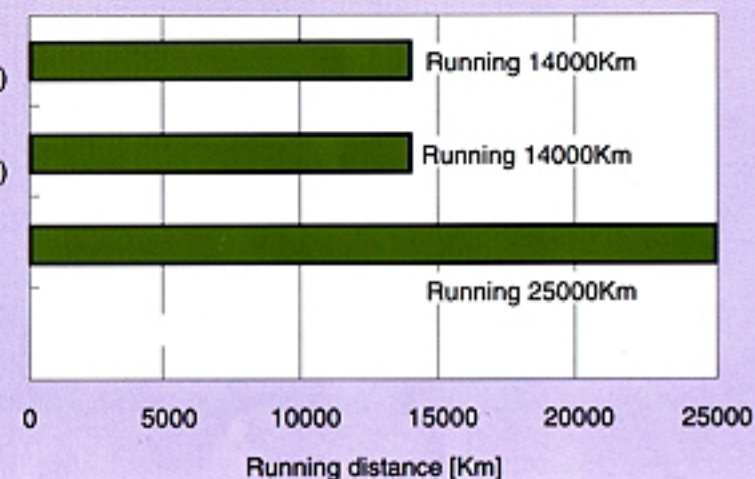
Load: None

NSK K1, Z1
(middle speed)

NSK K1, Z3
(middle speed)

NSK K1, Z1
(high speed)

No NSK K1
No lubrication
(high speed)



NSK K1™ TECHNICAL SHEET <SEMICONDUCTOR and LCD MANUFACTURING EQUIPMENT>

Excellent Lubrication for Cleaning Equipment

Wear life is 3 times longer than normal seals under wet conditions

Endurance test in water

Test conditions

Product: LS30 stainless steel

Preload: Z1

Load: 480Kgf

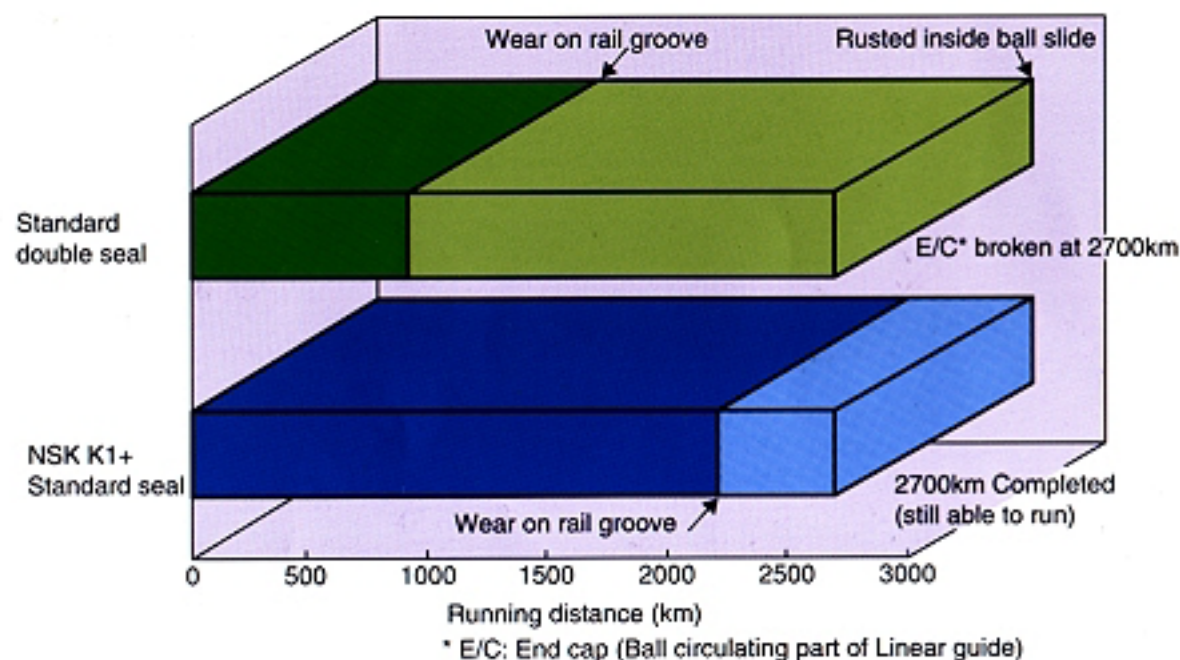
Stroke: 400mm

Speed: 24m/min

Lubrication: Grease full pack

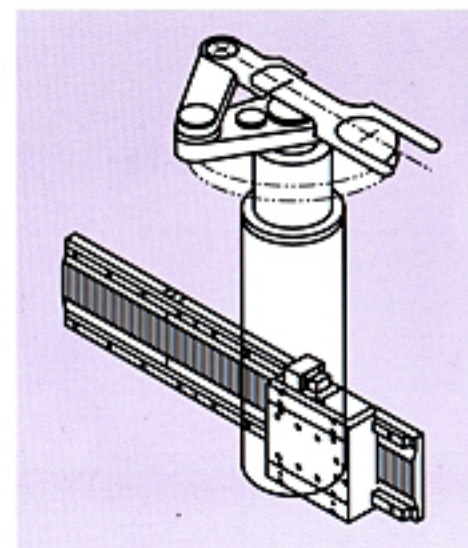
Water Exposure: Run in water 1 day per week.

(Viscosity index: 280, Viscosity: 580cst)



Applications

- Chamfering M/C for LCD panel
- Material handling for LCD panel
- Inspection M/C for LCD panel
- Thin film deposition equipment for semiconductor
- Wafer cleaning M/C
- Chip mounter
- Polishing machine
- Handler & carrier arm
- CMP



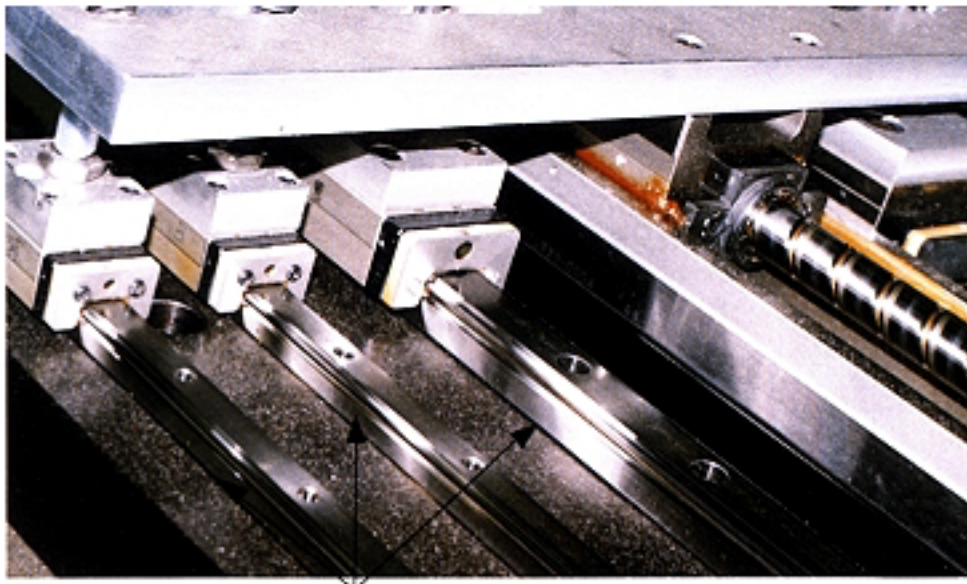
NSK K1™ TECHNICAL SHEET <MEDICAL / NURSING EQUIPMENT, FOOD PROCESSING>

Keeps equipment and adjacent areas clean

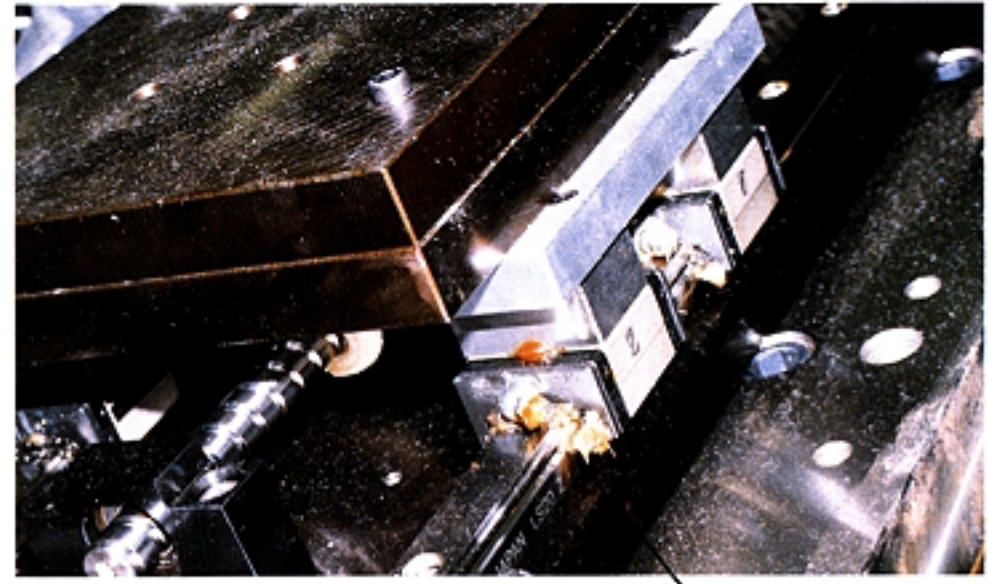
NSK K1 installed linear guide

Replenishing grease is not required
so machines are kept clean

Grease lubricated linear guide



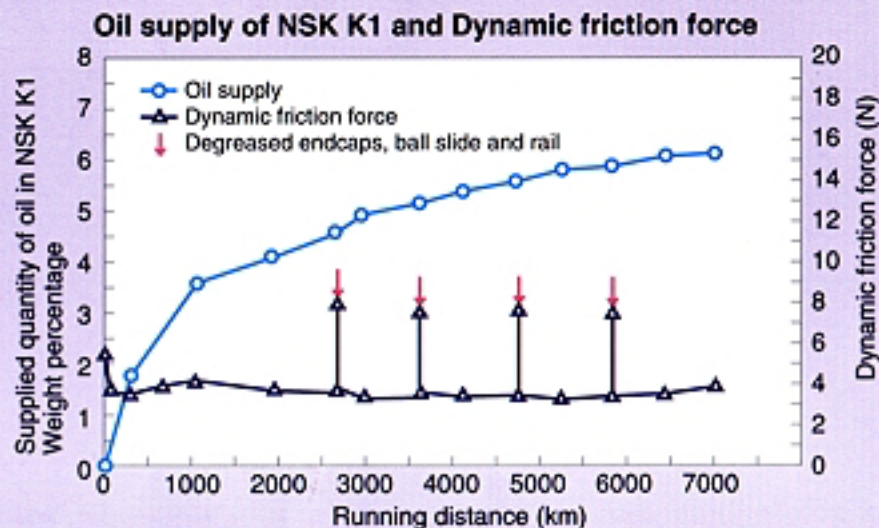
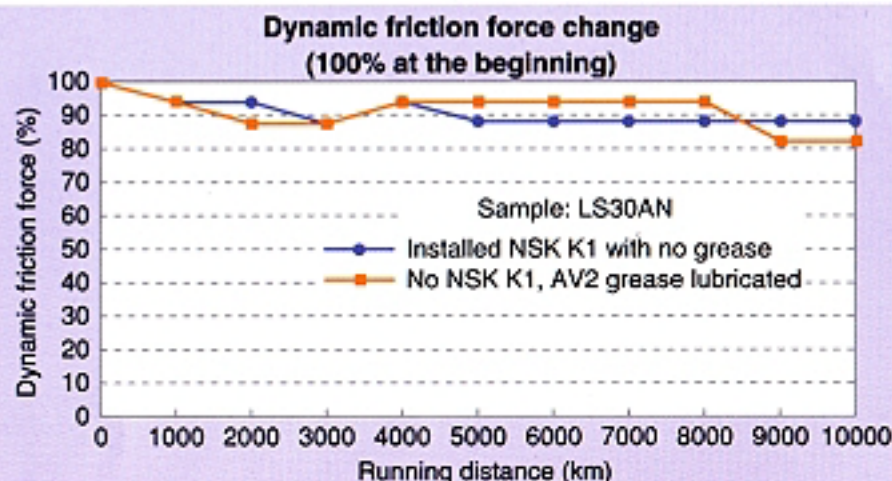
Keeps machine clean



Overflowed grease

NSK K1™ TECHNICAL SHEET <MEDICAL / NURSING EQUIPMENT, FOOD PROCESSING>

Good Operability (Stable Dynamic Friction Force)



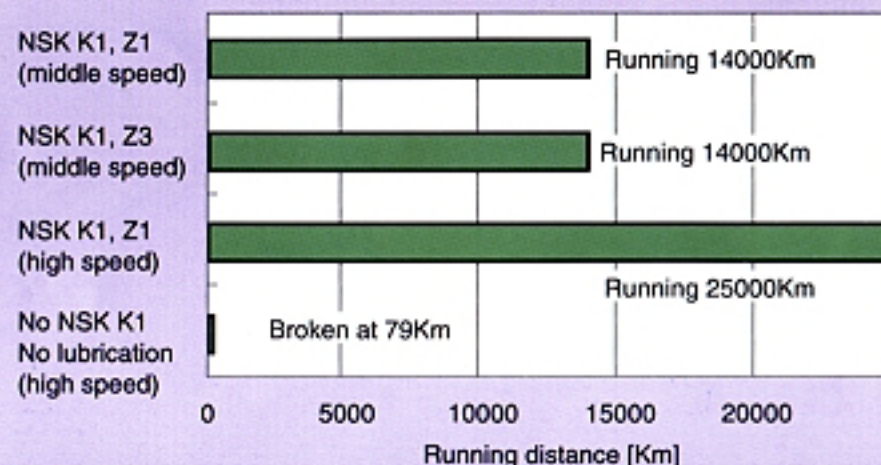
Sample: LH30AN-Z1 only with NSK K1
Speed: Average 38.4m/min Stroke: 800mm Load: No load

High Performance of Lubrication – Maintenance free

**Over 25,000km running with only NSK K1
Endurance Test without Additional Lubrication**

Test conditions

Sample: LH30AN	Preload: Z1, Z3
(High speed test)	(Medium speed test)
Speed: 200m/min	Speed: 60m/min
Stroke: 1800mm	Stroke: 750mm
Load: 63N/1 ball slide	Load: None



NSK K1™ TECHNICAL SHEET <MEDICAL / NURSING EQUIPMENT, FOOD PROCESSING>

Maintains Good Lubrication even when Exposed to Water

Wear life is 3 times longer than normal seals under wet conditions

Endurance test in water

Test conditions

Product: LS30 stainless steel

Preload: Z1

Load: 480Kgf

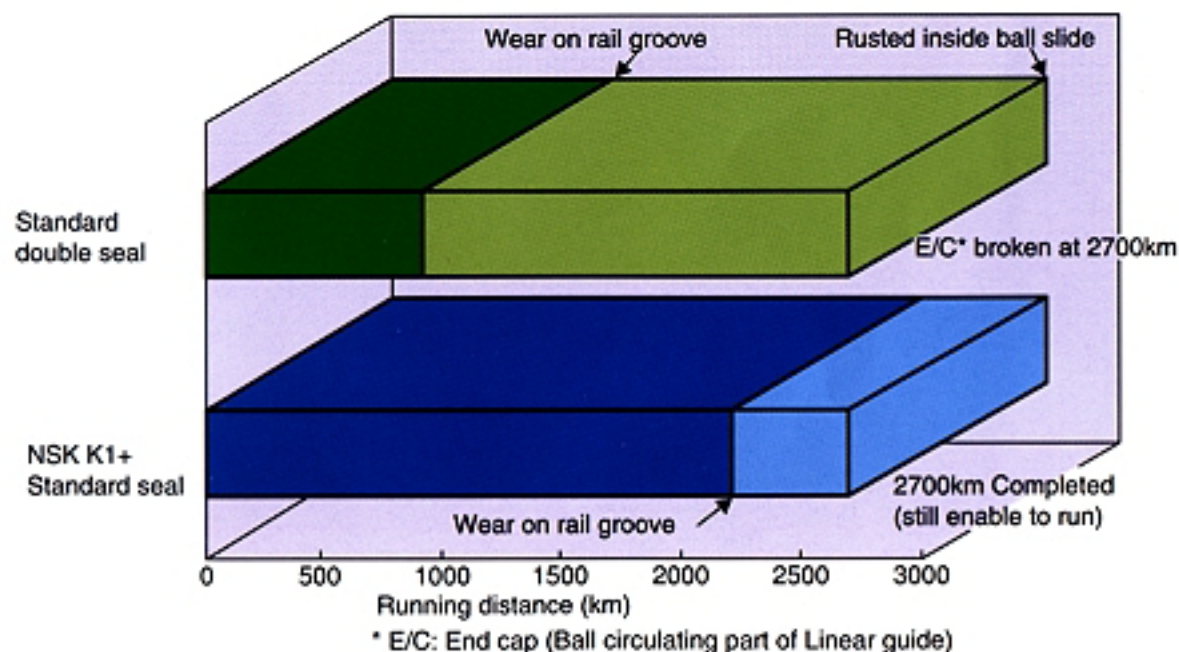
Stroke: 400mm

Speed: 24m/min

Lubrication: Grease full pack

Water Exposure: Immersed in water 1 day per week.

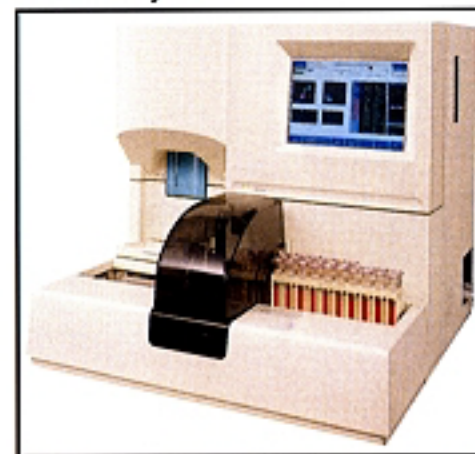
(Viscosity index: 280, Viscosity: 580cst)



Applications

- Body examination equipment
- Blood analyzer
- Examination tables & Hospital beds
- Scanning equipment
- Other analyzer
- Nursing equipment & The handicapped aids
- Food processing
- Food transporting equipment

Blood analyzer



MEMO

NSK Ltd. has a basic policy not to export any products or technology that has been designated as controlled items by export related laws. When exporting such products that are shown in this pamphlet, the laws of the exporting country must be observed.

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