Proposal of Products for Machine Tools
Proposal of Various Products for Machine Tools

High-performance and reliable products that support machine tools and continue to evolve in response to customer needs.

Product line-up for machining centers

- Spindle unit
  - High-speed
  - High precision
  - Minimal temperature increase
- Spindle bearings
  - High speed
  - High precision
  - Minimal heat generated
- Motor bearings
  - High speed
  - Minimal temperature increase
- Motor bearings
  - Clean environment
- Air clean unit
  - High reliability
  - Clean environment
- Oil air lubricator
  - High speed
  - Minimal temperature increase
- Slowing rim bearings for table
  - Ultra high rigidity
  - High precision
- Ball screw support bearing unit
  - Easy installation
  - High rigidity
  - High precision
- Ball screw
  - High transmission efficiency

Product line-up for lathes

- Spindle unit
  - High rigidity
  - High precision
  - Minimal temperature increase
- Spindle bearings
  - High speed
  - High precision
  - Minimal heat generated
- Ball screw support bearings
  - High rigidity
  - High precision
  - Minimal temperature increase
- Motor bearings
  - High rigidity
  - High precision
- Motor bearings
  - High transmission efficiency
- Tailstock bearings
  - High rigidity
  - High precision
  - Minimal heat generated
- Ball screw support bearing unit
  - Easy installation
  - High rigidity
  - High precision
- Ball screw
  - High rigidity
  - High precision

Please consult JTEKT for detailed information on products other than the main spindle bearings.
Please contact JTEKT for details regarding the machining center spindle unit.

**Spindle unit**

*For machining centers*

- **NT30** standard/high-speed type
  - Limiting speed: 16,000 min⁻¹
  - Lubrication method: Grease
  - Drive method: Belt

- **NT40** standard/high-speed type
  - Limiting speed: 10,000–16,000 min⁻¹
  - Lubrication method: Grease or oil-air
  - Drive method: Belt or built-in

- **NT50** standard/high-speed type
  - Limiting speed: 6,000–11,000 min⁻¹
  - Lubrication method: Grease or oil-air
  - Drive method: Belt or built-in

Please contact JTEKT for detailed product information.

*For lathes*

- **SPM 100CA**
- **SPM 100CB**
- **SPM 100CE**

Example of rotational speed/rigidity range and spindle unit selection

### Ball screw support bearings (SAC series) / Ball screw support unit (BSU series)

#### Ball screw support bearing selection chart

- **SPM 100CA** series
- **SPM 100CB** series
- **SPM 100CE** series

- **External ball circulation (standard)**
  - SAC2562B for 25 shaft diameter
  - SAC3062B for 30 shaft diameter

- **Internal ball circulation (compact)**
  - SAC3572B for 35 shaft diameter
  - SAC4072B for 40 shaft diameter

- **Return-block type (compact/high load/high lead)**

Please contact JTEKT for detailed product information.
**Proposal of Main Spindle Bearing Arrangement**

### For machining centers

- **High-speed performance:**
  - Matched pair angular contact ball bearings + Double-row cylindrical roller bearings
  - Matched pair angular contact ball bearings + Single-row cylindrical roller bearings

- **Nominal contact angle:**
  - Over 10°
  - Under 17°

- **Bearing type Cross-section**
  - Angular contact ball bearings
  - Double-row cylindrical roller bearings
  - Matched pair angular contact ball bearings + Double-row cylindrical roller bearings
  - Tapered roller bearings + Double-row cylindrical roller bearings

### For lathes

- **High-speed performance:**
  - Double-row cylindrical roller bearings
  - Double-direction angular contact thrust ball bearings

- **Load & Displacement:**
  - Displacement: 1st, 2nd
  - Load: 1st, 2nd

- **Bearing type Cross-section**
  - Angular contact ball bearings
  - Double-row cylindrical roller bearings
  - Matched pair angular contact ball bearings + Double-row cylindrical roller bearings
  - Tapered roller bearings + Double-row cylindrical roller bearings

### Proposal of Various Bearings for Machine Tools

### Bearings for machining center main spindle

- **Bearing type Cross-section**
  - Angular contact ball bearings
  - Double-row cylindrical roller bearings
  - Matched pair angular contact ball bearings + Double-row cylindrical roller bearings
  - Tapered roller bearings + Double-row cylindrical roller bearings

### Bearings for lathe main spindle

- **Bearing type Cross-section**
  - Angular contact ball bearings
  - Double-row cylindrical roller bearings
  - Matched pair angular contact ball bearings + Double-row cylindrical roller bearings
  - Tapered roller bearings + Double-row cylindrical roller bearings

### Ball screw support bearings for machining centers/lathes (SAC series) / Ball screw support unit (BSU series)

- **Bearing type Cross-section**
  - Precision ball screw support bearings
  - Double-row type
  - SAC (60°)
  - BSU (60°)

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**Example of technology examination**

**Examination flow**

- Customer specification conditions
- Bearing type and arrangement
- Bearing dimensions
- Bearing fits and preload amount
- Service life of bearings
- Examine main spindle rigidity/critical speed
- Propose best bearing type and arrangement

**For details, please refer to**

-Cat. No. B2005E-1

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**Note:** Combined purchase with spacers is also possible.

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**Recommended**
### Transitions in main spindle bearing technologies

#### Society/Machine tool manufacturer trends
- Mass production, improved productivity
- High-mix, low-volume manufacturing
- High functionality/High quality

#### Machining center (MC) trends and market needs
- Horizontal/Vertical MCs
- Double-column MCs
- Narrow-width MCs
- Large MCs
- High-speed rotation (faster machine tools)
- Seizure resistance
- Chatter measures

#### Indication of higher speeds
- 400,000 dm\(n\)
- 800,000 dm\(n\)
- 1,500,000 dm\(n\)
- 3,500,000 dm\(n\)
- 4,000,000 dm\(n\)

#### Transitions in bearings for the machining center main spindle

#### Transitions in bearings for the lathe main spindle
- Standard series
- High-ability series
- Next-generation high-ability series
- High-precision lathe

#### Lathe trends and market needs
- Standard lathes
- Vertical lathes
- NC lathes
- Combination lathes
- Ultra-precision lathes
- Higher rigidity
- Higher speed
- Longer-life grease
- Ultra-precision lathes

### Proposal of Products for Machine Tools

#### Standard series
- High-speed rotation/Lightweight resin cage

#### High-ability series
- HAR
- 3NCHAC
- 3NCHAD
- 3NCHAF

#### Next-generation high-ability series
- N1000

#### High-precision lathe
- Double-row cylindrical roller bearing

#### High-precision matched pair angular contact ball bearing
- ACT000DB

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- Standard lathes
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- Ultra-precision lathes
- Higher rigidity
- Higher speed
- Longer-life grease
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Oil / air lubrication

Bearing inner diameter

Series of recommended sizes developed
(sizes with high volume market demand)

Result
Suggestion of user-friendly bearings for customers as well as better delivery lead time and availability, and good cost-performance

Proposal 1
Recommended series are decided based on high-speed performance and rigidity

Proposal 2
Proposal to support lower noise and ultrahigh-speed

Support for low noise

Rotational speed (dmn value)

3.0 x 10^4
(Position preloading)

Support for ultrahigh-speed

Rotational speed (dmn value)

3.5 x 10^4
(Constant-pressure preloading)

For reference

Next-generation high-ability series

Ceramic balls
Circumferential groove and nozzle
Effective supply of oil and air to raceway area Effective reduction of oil and air supply noise

Ceramic balls
Circumferential groove and nozzle
Effective on improving lubrication reliability during high-speed rotation and reliability during sudden speed changes

Too many bearings types makes it complicated to select bearings matched to the desired specifications of the main spindle

Proposal situation

Proposal

"Please see the following catalog for detailed information on models other than those recommended. (Precision Ball & Roller Bearings for Machine Tools) CAT. No. B2005E-1"