Value & Technology
For superior strength and durability in all environments

Heavy machinery in the agriculture and construction supports economic growth and infrastructure, and is indispensable in daily life. JTEKT’s highly functional products contribute to ensuring long service life in severe conditions and improving reliability.

JTEKT products supporting heavy machinery in agriculture and construction

Under such severe conditions, JTEKT responds with No.1 & Only One technologies.
Responding to Needs with No.1 & Only One Technologies

With a manufacturing history of more than 90 years, JTEKT clearly understands the needs of its customers, promptly delivers the reliability and product competitiveness required, and backs it up with a global support system.

**Improved Durability**
- Improved load performance
- Better misalignment endurance
- Improved life in contaminated oil
- Improved lubricating technologies
- Low friction torque
- Lightweight
- Extending maintenance cycle
- Reusable

**Global Environmental Preservation**

**JTEKT Technology Responding to Needs**
- Optimum design technologies
  - Inner specification optimization
  - Crowning optimization
  - Low temperature rise design
- Material/heat treatment technologies
  - KE heat treatment: case-hardened steel
  - SH heat treatment: bearing steel
- Analysis technologies
  - Shaft System Analysis Program (SSAP)
  - CAE analysis (static analysis/dynamic analysis)
  - Benchmark evaluation tests
  - X-ray/ultrasound analysis
- Surface reforming technologies
  - Special coating process
  - Surface roughness optimization
JTEKT products responding to agricultural/ construction machinery needs

**Optimum design technologies**

**High performance tapered roller bearing**

- Inner ring rib surface: Special crowning
- Inner ring raceway surface: Special crowning
- Outer ring raceway surface: Special crowning

**Improved durability (edge stress mitigated by misalignment shaft and low temperature rise)**

- Due to optimization of inner specifications and special crowning of bearing ring, bearing force improved by misalignment.

**Misalignment durability life evaluation results**

- Conventional product
- Developed product

**Contact stress calculation results**

- Conventional product: 3 MPa
- Developed product: 2 MPa
- Load: 1,200 N

**Temperature rise evaluation results**

- Conventional product: 80°C
- Developed product: 72°C

- Due to special processing of inner ring rib and special crowning of bearing ring, low temperature rise is achieved. Bearing endurance also improved by oil film formation.

**Material/heat treatment technologies**

**KE heat treatment**

- KE bearing / Extra life Bearing

**SH heat treatment**

- SH bearing / Special heat treatment

**KE heat treatment / SH heat treatment**

- Special heat treatment realizes extremely hard raceway surface and optimization of residual austenite achieves long life. Especially, superior performance in contaminated oil.

**Type of peeling and countermeasure**

- Peeling
- Mixed Flaking
- Flaking from Dent
- Flaking initiated from sub-surface
- Contamination

**Optimization**

- Improve wear resistance
- Improve brinelling resistance
- Suppress elevation height
- Promote elimination of edge brinelling
- Improve toughness
- Reduce non-metallic inclusions

**KE bearing / SH bearing**

- Service life increased 10-fold

**SH bearing**

- Service life increased 10-fold

**KE bearing**

- Service life increased 10-fold

**Material/heat treatment technologies**

- Apply to case-hardened steel

- Apply to bearing steel

- KE heat treatment/SH heat treatment

- KE bearing: KE heat treatment
- SH bearing: SH heat treatment

- KE bearing: Extra life Bearing
- SH bearing: Special heat treatment

**Optimum design technologies**

- Due to special processing of inner ring rib and special crowning of bearing ring, bearing force improved by misalignment.

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**Extreme hard raceway surface**

- Ensure proper amount of cR
JTEKT products responding to agricultural/ construction machinery needs

### Analysis technologies

**Verify validity of optimum design**
- Fully utilizing the Shaft System Analysis Program (SSAP) developed by JTEKT and CAE analysis, an optimum design that gives peripheral components additional rigidity has been achieved. Validity is verified through benchmark evaluation tests (including simulation), and X-ray and ultrasound analysis.

  ![Shaft system rigidity analysis](image1)

  ![Contact stress analysis](image2)

**Inner temperature measurement results**
- Cage temperature

![Temperature measurement](image3)

*Abnormal rise in temperature
Normal*

140°C

25°C

### Surface reforming technology

**Special coating process**
- Durability 3-fold that of non-coated product

**Cage and roller (C&R) in response to poor lubrication**
- Roller surface roughness optimized for improved oil film retention

### Large-sized Bearing Technology Development Center

- JTEKT has established and started operation of the Large-size Bearing Technology Development Center, where large-sized bearings used in industrial machinery are evaluated and analyzed. Until now, large bearings were manually inspected and then put into the actual machinery for basic evaluations. However, the newly established development center enables more detailed evaluation by reproducing environments close to those of actual use inside the company.

### JHS Series Spherical Roller Bearings

**JHS Series Spherical Roller Bearings**
- JHS Series Spherical Roller Bearings are satisfy the demanding needs of our customers. Manufactured using innovative materials, an optimal internal design and a standardized dimension stabilizing treatment, these bearings have a longer service life, faster rotation speed, enhanced axial load performance and can be used in high-temperature applications.

**Bearing composition diagram**

- **Outer ring**
  - JTEKT specification steel
- **Roller**
  - Roller maximized
  - Number of rollers increased
  - Roller position stabilized
- **Inner ring**
  - JTEKT specification steel

**Longer service life**
- Max. 4-fold compared to our existing products

**Axial load performance**
- Max. 20 %UP compared to our existing products

**Speed increased**
- Permissible rotation speed
  - Max. 25 %UP compared to our existing products

**High-temp. use**
- Up to 200 °C

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Agricultural and Construction Equipments
Maintenance hours reduced by improving cross bearing life and seal performance.

Seal technologies responding customers’ needs for a variety of applications.

Long-interval greasing cross bearing

Thrust washer (PA66+GF)
- Abrasion resistance improved by adding glass fiber

Oil seal
- Seal lip from double to triple, and the optimization of the shape and position

Roller
- Cross bearing life test results
- Reduction of contact stress by length up and crowning optimization

Greasing interval increased 10-fold

Muddy water resistance technology

Side lip added to axle oil seal, creating multi-structured lip that prevents muddy water inclusion/oil leakage when traveling.

Tub formed using side lip and metal case.
- Directs muddy water downward.

Lip wear width reduced 60%

- Muddy water resistance performance multi-structured lip

Low-torque technology

- Low-torque oil seal for engine/transmission contributes to reducing fuel consumption

- Lip length and hip thickness optimized, lowering strain force and abrasiveness

Lip wear width reduced 60%

- Muddy water resistance performance multi-structured lip

Rotating torque reduced 30%

- Low-temperature environment

Low temperature technology

Sealing performance improvement technology

Stable sealing performance maintained by optimizing design optimized and changing the rubber material that inhibits lip torsion caused by sudden servo motor acceleration/deceleration.

Service life increased 5-fold

- Design optimization
- Composition ratio (b/a): Large Contact angle, R value: Standard

Low-temperature performance improved 2-fold

- Rubber material abrasion characteristics lip sliding part after abrasion (dry test)

Muddy water resistance technology

- Each flange bend relates muddy water

Spline seal structure of muddy water resistance improvement

Vent (dedicated to exhaust)/O ring
- Prevent suction of muddy water when spline sliding

Oil seal
- Rigidity of seal lip increased by changing material, from NBR to polyurethane rubber

Cover tube
- Function of labyrinth achieved by extending the distance between seal and spline

Muddy water resistance improved 5-fold

- Stiff lip from double to triple, and the optimization of the shape and position

Service life increased 5-fold

- Design optimization
- Composition ratio (b/a): Large Contact angle, R value: Standard

Low-temperature environment

- Low-temperature performance improved 2-fold

- Rubber material abrasion characteristics lip sliding part after abrasion (dry test)

Low-torque technology

- Low-temperature oil seal for engine/transmission contributes to reducing fuel consumption

- Lip length and hip thickness optimized, lowering strain force and abrasiveness

- Lip wear width reduced 60%

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Hydraulic Components

With a standard lineup by highly efficient external gear pump technologies, JTEKT hydraulic systems are built to respond to customer’s requirements and specific needs.

Hydraulic (external gear) pump/motor lineup

<table>
<thead>
<tr>
<th>Model</th>
<th>Basic Displacement</th>
<th>Max. Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic (external gear) pumps</td>
<td>0.25-100cc/rev</td>
<td>330p</td>
</tr>
<tr>
<td>Hydraulic (external gear) motors</td>
<td>0.25-100cc/rev</td>
<td>250p</td>
</tr>
</tbody>
</table>

Features

- Fuel consumption reduced
- Low noise
- On-demand cooling possible by setting various parameters
- Downsizing and Weight reduction
- Fan-stop and Reverse function

Cooling fan system with hydraulic motor control (HMC)

(HMC system)

Hydraulic control of fan speed ensures optimized cooling conditions for the engine and radiator.

Electric pump set/power pack lineup

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow Rate</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric pump set (Micro/Mini) DC Type</td>
<td>0.4-25 L/min</td>
<td>490-4900 W</td>
</tr>
<tr>
<td>AC Type</td>
<td>1-25 L/min</td>
<td>550-4900 W</td>
</tr>
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</tbody>
</table>

Valve/Block lineup

Valve
- Pilot poppet Solenoid valves
- Spool solenoid valves

Block
- NAF: Automatic Function Blocks for in-Line mounting
- NBS: Modular Block System
Global Technical Support ( Bearing Development Bases) 

Technical centers located around the world ensure quick response and technical support for customers’ needs.

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