

Steering business



With the No.1 share in the world, steering is our flagship business. This business is already contributing to the improvement of the environment (energy-saving), safety and convenience through offering electric power steering (EPS) primarily for passenger vehicles. With the No.1 share in the world, steering is our flagship business.

In FY2017, we strengthened our rack assist type EPS lineup and realized a full lineup from column type to rack parallel and dual pinion type. In FY2018, we will mature our rack parallel and dual pinion type, and concentrated our efforts on sales expansion and continue refining our steering business to support our No.1 global share status. As we head towards an era of autonomous driving, JTEKT will apply and propose the technologies we have cultivated in the EPS area not only to passenger vehicles, but also to commercial vehicles, in order to continue contributing to the realization of a safer and more comfortable automotive options.

description of business

Offering a steering device that shares the "turning function" which is one of the basic functions of a car.

Offering the column assist type (mainly column type EPS - hereinafter C-EPS) and the high-power rack assist type (rack parallel type EPS, dual pinion type EPS - hereinafter RP-EPS, DP-EPS)



Strengths

Presenting a full lineup of EPS products

- By incorporating C-EPS, RP-EPS and DP-EPS in our major product lineup, JTEKT offers EPS products for practically all sizes of passenger vehicles.

Global supply system

- In addition to producing DP-EPS in Japan, China, America and Europe, as well as RP-EPS in Japan, China and America, we have also established a production base in Morocco, Africa set to commence mass production in 2020.

Technological capabilities realizing ongoing safety and security

- Steering systems are a major safety component and JTEKT has produced high-quality, high-performing steering systems for decades.
- As a result, we have earned the place of No.1 in global share.

Business environment analysis

Advancement to EPS for large vehicles due to society's increasing demands for fuel efficiency

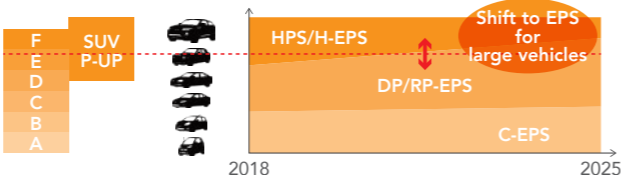
- We anticipate the further popularization of EPS to achieve greater fuel efficiency in large vehicles.

Intensification of C-EPS cost competitiveness

- Cost competitiveness will intensify from here on due to advancement in the commoditization of products and participation by Chinese manufacturers, etc. in the C-EPS market.

Changing needs due to the expansion of autonomous driving

- We predict that steering-related needs will change in the context of autonomous driving.



Mid-term Plan

To maintain our No.1 global share position, JTEKT has established three major points of our mid-term plan aimed at firmly retaining 25% of overall market share.

Expansion of the rack assist type EPS business

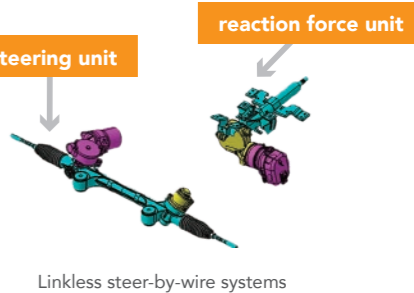
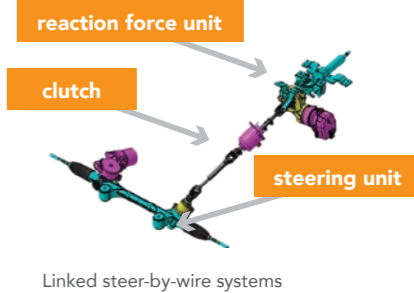
- Expand sales of high power DP-EPS/RP-EPS in line with the shift to EPS for medium to large-sized vehicles.
- Development of an RP-EPS system equipped with a lithium ion capacitor as an auxiliary power source to apply EPS to large vehicles with certainty.

Improved EPS cost competitiveness

- In addition to existing cost reduction activities, concentrate efforts on optimization of purchasing cost through In-house production of major parts (MCU) and reduction of manufacturing cost through automation of production.

R&D considering autonomous driving

- Promote development of a steer-by-wire steering system in preparation for the realization of autonomous driving.



Progress in FY2017

Launch of global RP-EPS production

- After commencing mass production in Japan in December 2016, also commenced mass production in North America in FY2017. Plan to start production in China in the future (Dec. 2019).

Strengthening of business foundation

- Through consolidation with Indian company, Sona Koyo Steering Systems, (currently JTEKT India LTD.), we have strengthened our presence in the Indian market.
- Through making Fuji Kiko a wholly-owned subsidiary, we have strengthened our system response ability, including those related to manual columns.



Establishment of a software development base considering the autonomous driving era

- Establishment of JTEKT IT Center Akita Corporation as a software development base.

Expansion of areas for EPS application

- Development and mass production of "I-EPS", electric power steering for multi-purpose vehicles used in the agricultural field in North America for carrying loads or transportation (adopted on Kubota's UTV "RTV-XG850").



Solutions for social issues (from the perspective of SDGs)



- Supporting realization of a society free of road accidents through autonomous driving
- Contributing to the greater fuel efficiency of cars, including not only passenger vehicles, but also commercial vehicles
- Establishment of global development bases and nurturing of developers to contribute to enhanced technological capabilities in each country

Driveline business



The Driveline Systems business offers products for the automotive industry such as drive shafts, propeller shafts, ITCC, Torsen and oil pumps. In FY2017, we engaged in activities to strengthen our business foundation such as thorough cost-reduction activities and front-loading activities.

In FY2018, we will escalate these activities as businesses and pave the way to further growth. Through the energy-saving, improved travelling safety and other benefits provided by our driveline parts, we will contribute to the creation of a safer society for people.

description of business

Offer driveline products for vehicles, torque control device (TCD), hydraulic unit, valve unit for fuel cell vehicles (FCV), etc.



Drive shaft



Next generation ITCC



Electrical oil pump

Strengths

An attractive product in a No.1 global share position

- Torque-sensitive limited-slip differential (TORSEN)
- Intelligent torque controlled coupling (ITCC)

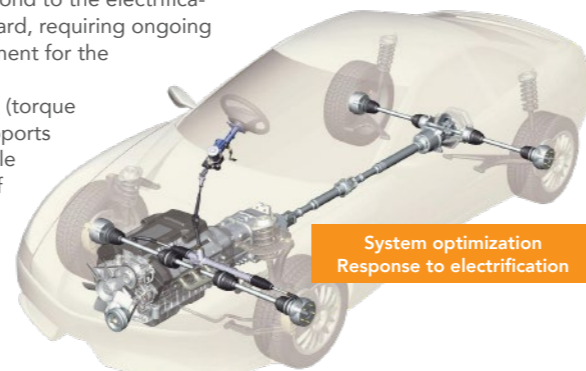
Broad technology lineup

Possess core technologies relating to the "travelling" of vehicles including torque management, gear machining, hydraulic systems, tribology and coating.

Business environment analysis

An increase of new needs in accordance with advancements in electrification and autonomous driving

- A shift in conventional products from advanced countries to newly emerging countries.
- JTEKT will need to respond to the electrification trend moving forward, requiring ongoing technological advancement for the mid-to-long term.
- Expand the role of TCD (torque control device) that supports the safe and comfortable turning and stopping of vehicles.



Mid-term Plan

With the aim of exponentially advancing our position as a driveline system supplier, we will accelerate strengthening of our system development capabilities and engage in product development for vehicle electrification (EV, FCV, etc.).

Strengthen development of driveline systems

Our products have been held in high regard at vehicle test drive sessions in cold regions and we have improved our ability to make system proposals through dialogue with customers. By evolving from a module supplier to a system supplier and responding to all development processes as a system, we will endeavor to further improve our ability to present proposals to customers.



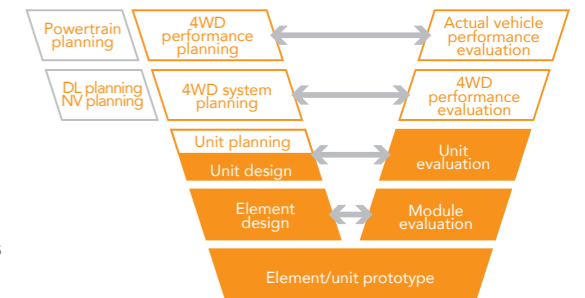
Cold region test drive event (Sweden)

Driveline

- Strengthen product appeal such as weight reduction, low loss and rigidity optimization.

AWD system

- Contribute to weight reduction and higher fuel efficiency through integration with differential gear, improved responsiveness, size reduction, etc. Developments to strengthen product appeal, such as E-AWD systems which utilize JTEKT's strengths.

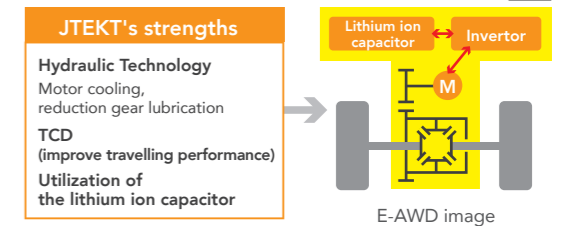


Hydraulic system

- Promote higher efficiency of electrical oil pumps (small, lightweight, high flow volume, high output) responding to applications emerging as a result of vehicle electrification/series development

Parts for FCV (Valve, pressure-reducing valve)

- Full-scale mass production of parts for FCV and future expansion of areas including trucks, rail and vehicles for industrial machines.



Progress in FY2017

Driveline

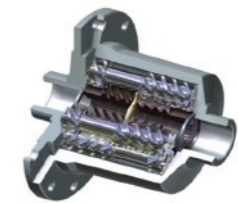
- New series development, thorough cost competitiveness.

AWD system

- Began equipping FF vehicles with Torsen Type-B as a product that achieves a safer and more comfortable driving experience.
- Development of Torsen for small trucks capable of performing in harsh operating conditions.

Hydraulic system

- Began mass production of oil pumps (internal gear/parallel type) which are smaller and higher efficiency, for use with the latest AT.



Next-generation torsen (Diff-lock attached)



Torsen for small truck



Demonstrates high durability in harsh environments, carrying heavy loads or travelling on muddy roads

Solutions for social issues (from the perspective of SDGs)



- Contributing to the realization of a safer automotive industry by producing high-quality, innovative parts that enhance automobile turn and stop capabilities.
- Offering driveline systems that create higher fuel-efficiency cars
- Contributing to the sustainable development of an industry overall by providing products that respond to the needs of EVs

Bearing business



Our bearing products are used in rotating parts for all industries, from cars to industrial machinery, and are supporting society from behind-the-scenes. In FY2017, we strengthened our business with a focus on the further enhancement of production and development foundations. In FY2018 we will continue to maintain these business foundations as well as concentrate on the development of revolutionary, new products. In the automotive field, we will respond to electrification and autonomous driving trends while in the industrial machinery field we will develop solution proposal-type business and offer value and service throughout the lifecycle of products. Through these activities, we will contribute to the realization of a better society from the perspective of energy-saving and social infrastructure.

description of business

Development and manufacturing of bearings for vehicles such as powertrains, chassis-related parts and bearings for all industrial machinery, ranging from bearings for unit products and precision machinery to super-sized bearings for tunnel boring machines



Super-low friction torque tapered roller bearing (LFT-IIIIV)



3rd generation tapered hub unit



Extra large size revolving seat bearing for tunnel boring machines

Strengths

Low-torque technology

- Overwhelming low-torque technology represented by the LFT (Low Friction Torque) series.

Broad product lineup

- Responding to a wide-variety of industrial machine applications.

Technique for evaluation and analysis

- Enables evaluation and analysis in an environment closely resembling actual cars at the Iga Proving Ground or actual machines at the Large Size Bearing Engineering Development Center.

JTEKT Group strengths

- The ability to execute comprehensive development projects from our customers' perspectives due to having both an auto parts business and machine tool business within the JTEKT Group.

Business environment analysis

(Automotive bearing) Advancement of electrification and autonomous driving

- Acceleration of product development/product release considering needs surrounding changes to cars.

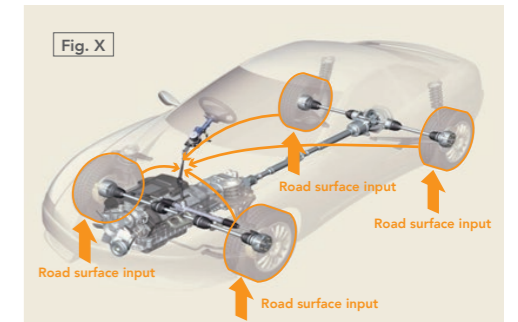
(Industrial machine bearings) Further diversification of the environments in which bearings are used

- Timely development and market release of products, technologies and services responding to further sophistication of robots and automation.

Mid-term Plan

Strengthening response to electrification and autonomous driving

- Deepening of low-torque technology, which is our strength, development of a super light weight hub unit bearing specifically for EV and development of technologies to support the needs of higher speed, lighter weight, better electrolytic corrosion resistance and improved quietness.
- Contributing to autonomous driving through vehicle integrated control technology utilizing the hub unit's sensing function (Fig. X).

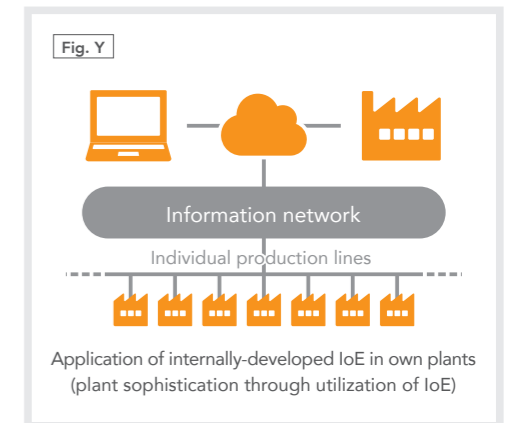


Strengthening response to industrial machine field

- Development of solution proposal-type business.
- Offer value/service throughout product lifecycle.

Sophistication of creation

- Promotion of operator reduction/automation in production processes through the utilization of machine tool-related IoE also (Fig. Y).
- Promote sophistication of working styles, a shift to "small-numbers/exceptional talent", and sophistication of plants.



Strengthening of business structure

- Reorganization of global production bases and further strengthening of production capabilities (Japan, China, ASEAN, Europe, North America).
- Strengthening of global development system in Japan, America and Europe.

Progress in FY2017

Released new products and technologies

- Released the high-speed rotation deep groove ball bearing, machine tools, revolving seat bearing for tunnel boring machines and a bearing for special environments



Development of high-speed rotation deep groove ball bearing

Promoted operator reduction/full automation

- Expanded operator-reduced/fully-automated lines (automation of appearance inspections/conveyance/packaging and utilization of IoE)

Strengthened production/development systems

- As part of strengthening global production/development systems for the needle roller bearing, the new Kiyohara plant was built at Utsunomiya Kiki (commenced operations June 2018)



Utsunomiya Kiki, new Kiyohara plant (Kiyohara, Utsunomiya city, Tochigi pref.)

Solutions for social issues (from the perspective of SDGs)



- Contributing to reduced energy loss in all fields by better low-torque technology and supporting electrification



- Offering products on a broad basis including tunnel boring machines, railway, planes, robots, farming/construction machinery and medical devices
- Supporting industrial advancement and helping to maintain/improve abundant life environments for people by making proposals to the global market that foresee needs

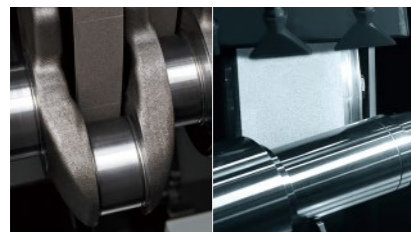
Machine Tools & Mechatronics business



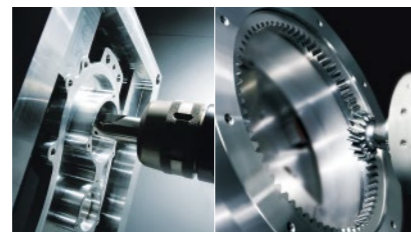
The Machine Tools & Mechatronics business supports our customers in "Monozukuri" through the provision of machine tools and mechatronic products such as grinders, machining centers and control systems.
In FY2017, we promoted front-loading activities to strengthen our ability to present proposals to customers parallel to efforts to streamline our production processes.
In FY2018, we concentrated our efforts on development of new products responding to a shift towards EVs expected to entail next-generation downsized engines and market growth. Moving forward, as a group of monozukuri professionals, we lead our customers in the transition to IoE and smartification of manufacturing lines overall, we will continue supporting the development of the world's manufacturing industry, starting with automotive.

description of business

In-house manufacturing of precision element components and system equipment such as cutting machines, machining centers, gear skiving centers, control systems represented by cam/crankshaft grinders and general-purpose cylindrical grinders. Solutions overall lines and overall plants are offered by specialists in the technologies and products required for "Monozukuri".



Grinders



Machining Centers



Control systems

Strengths

High-accuracy and high-efficiency grinders equipped with TOYODA STATBEARING

- Adopt in-house made, easy-to-use CNCs specifically designed for grinders. World-class practical ability with our cam/crankshaft grinders

High-rigidity machining centers good at machining difficult-to-machine material

- Support a broad variety of production, ranging from automotive-related to farming and construction machinery

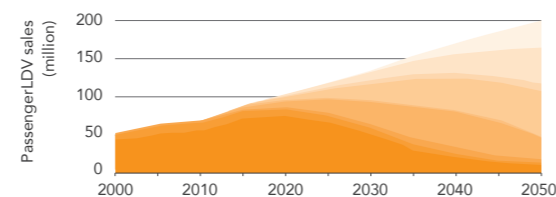
Control systems that have advanced hand-in-hand with car production lines

- Visualization reflecting feedback from production shop floors covering everything from plant management to line control
- In-house development and manufacturing of control systems and high-functionality of machine tools.

Business environment analysis

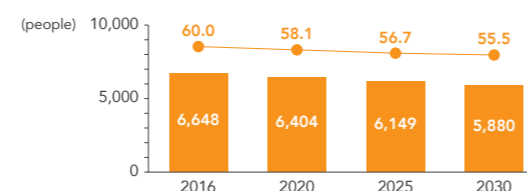
Changing trends of vehicle powertrains

- Engine downsizing and increased motors and batteries.



Reduction in working population

- Increased labor-saving and automation needs.



Mid-term Plan

Strengthening response to changes in automobile trends

- Slimmed down machining systems supporting engine downsizing.
- Highaccuracy grinding contributing to the quietness of EVs.
- Strengthening production/sale mechanisms in the expanding regions of China, India and ASEAN.

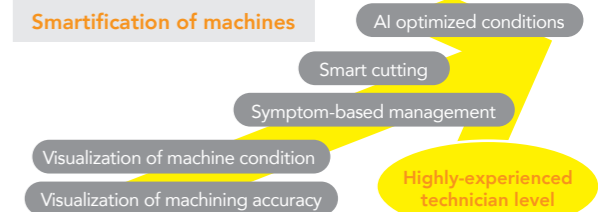
Shift to fields of growth

- Higher added-value for motors, batteries, semiconductors, robots, aircraft components and equipment components.
- Creating a next-generation gear machining system.
- Commercializing new machining technology such as additional machining.

Contributing to maintenance and advancement of society's production activities

- A future shortage of skilled workers, proposing high-efficiency production systems incorporating machine smartification and IoE technology.

Increasing development speed by shifting to a common platform



Progress in FY2017

Response to sophistication of automotive-related needs

- Released the GF50M Series - twin wheel crankshaft grinders with improvements in terms of high accuracy, high productivity and flexibility.



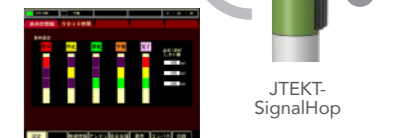
Response to EV-related needs

- Released GS200H - a gear skiving center realizing groundbreaking downsizing for easy insertion into mass production lines as a machine processing motor reducer components for EVs.



Response to related IoE needs

- Released JTEKT-SignalHop - an easy additional IoE tool that monitors the status lamps which indicate the operating status of machines for the visualization of operating status.



Promotion of business structure reform

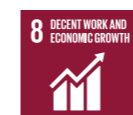
- Began sale of used machines. By strengthening aftermarket service, offer new value throughout the life cycle of our customers' machines to create a business substance resilient against economic fluctuation.
- As the third pillar of business, rolled out IoE-focused on monozukuri, turned three in-house plants into showrooms and expanded use cases.



Solutions for social issues (from the perspective of SDGs)



- Promoting efficient, energy-saving equipment to produce the optimal amount in the optimal location
- In regards to production environment, realizing smart factories with safe work environments, etc. leveraging IoE



- In order to improve the productivity of workers, thoroughly eliminating muda (waste) that does not produce added value to achieve efficient production with limited resources. Evolving monozukuri itself through the smartification of machines and plants.



- Achieving higher accuracy/lighter/smaller element parts, evolving high-accuracy grinders and gear skiving centers and realizing production activities with higher energy efficiency

* Gear skiving center is a registered trademark of JTEKT Corporation.
* TOYODA STATBEARING is a registered trademark of JTEKT Corporation.