This section introduces some of the major activities from FY2013, centered on 4 keywords. 3 of these keywords are based on the JTEKT GROUP VISION. We have added "Disaster Recovery Support" as the 4th keyword, as we believe it is an important issue which should be continually addressed.

### [ KEYWORD ] Building Value

P12 (KEYWORD) Building Excellent Products

# **JTEKT GROUP VISION**

Exerword I Building Professionals

# CSR Report 2014 PICK UP 2013

### Building Value

Safer, more convenient and comfortable, and kinder to the planet as well. We will continue to evolve JTEKT technologies and products, with the aim of creating new values that surpass the expectations of society.

### Addressing functional safety within electric power steering



Creating safe products is a social duty of all manufacturers in the automotive field. Recently, interest in the "functional safety" way of thinking has been increasing. The level of safety achieved is defined by the consistent correct operation of the electronic control system; ISO26262 was issued in 2011 as an international functional safety standard for automobiles. Since 2005, JTEKT has worked to reform the development process in order to conform to this standard.

#### Answering specific demands with a concrete work procedure

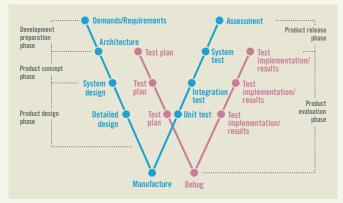
ISO26262 standardizes the de-

velopment process of electronic control systems installed in vehicles, so that safety is guaranteed even if components break or malfunction. Conformity with this standard has been a vital issue to JTEKT as a leading company in electric power steering (EPS).

"The requirements of ISO26262 are thoroughly stipulated for each phase of development. Our role was to convey each of those requirements into a specific work procedure that can be practiced by every engineer."

Since 2005, we have been reviewing this procedure while conducting information exchange and discussions with every engineer involved in development, includ-





Functional safety development process

ing system design, hardware design, and programming. The procedure was finally completed in 2013.

### Giving our all to eliminate every risk

JTEKT is currently moving forward with the introduction of process management tools to ensure more reliable and efficient operational performance within development.

"Electronic control systems for automobiles are likely to increase in sophistication and complexity. There will probably come a time when everybody uses automated driving. I think the development process we have built will be even more important when that era arrives."

JTEKT will continue to address functional safety.

"Our direct customers are automakers, but in the end, it is people all throughout the world who drive the automobiles into which JTEKT products are installed. I do my best to deliver risk-free products to drivers. That's my biggest motivation in my work."

### PICK UP Building Value

### KEYWORD

### **3rd generation ITCC**

→ E\_09 Related article

Driving performance and fuel efficiency are expected in automobiles. The JTEKT intelligent torque controlled coupling (ITCC) is a device that achieves high-dimensional driving stability, safety and fuel efficiency. In 1998, we pioneered and released a 1st generation ITCC product into the market. In 2004, we developed a 2nd generation ITCC with greatly improved durability that could be applied to large size vehicles as well; this product is utilized by major automobile companies throughout the world. We then drastically improved performance in low temperatures, succeeding in the development and mass production of a 3rd generation ITCC in 2013.

### Transmitting a consistently stable driving force

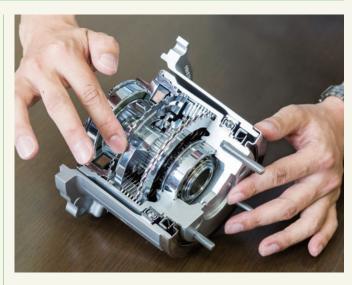
ITCC automatically transmits or stops driving force from the engine to the rear wheels in response to changes in the driving environment. The automobile runs on front wheel drive during normal operation, though driving force is immediately transmitted to all four wheels when necessary, such as when the front wheels are likely to slip. This produces significant effects within driving stability, safety and fuel efficiency.

In 2nd generation and earlier products, however, more driving force than necessary is transmitted to the wheels in low temperatures, reducing fuel efficiency. The development theme of the 3rd generation product concerned how small we could possibly make changes in driving force. Achieving the smallest possible changes will lead to further improved fuel efficiency.

#### Contributing to safety and energy-saving for automakers throughout the world

Most emphasized for issue resolution is the electromagnetic clutch, comprised of 2 types of metal plates. By adjusting in microns the grooves carved into each plate, performance at low temperature environments has been greatly improved.

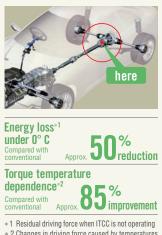
"We've hit many roadblocks such as deciding how to make the optimal shape and how to ensure stable mass production. However, we were able to



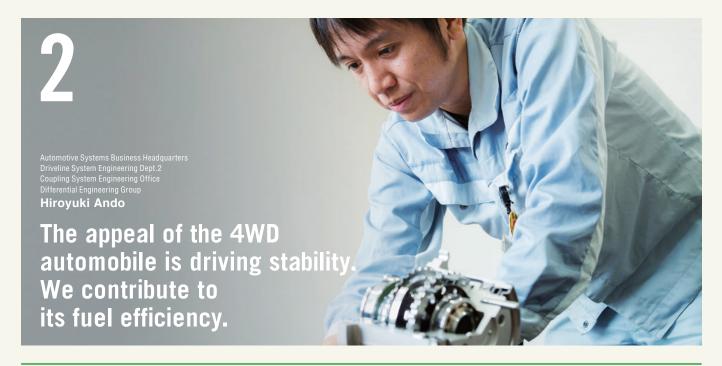
overcome these obstacles by combining our abilities with both internal and external engineers."

JTEKT plans to introduce the 3rd generation ITCC to automakers all over the world.

"It makes me happy to think that the widespread use of the products we develop contributes to energy conservation and driver safety. These aren't products that most people notice just by looking at a vehicle, but that in itself is very rewarding."



 2 Changes in driving force caused by temperatures below the 120° C to – 40° C range during ITCC operation



### **Building Value**

### 3rd generation tapered roller hub unit

#### → E\_09 Related article



Pickup trucks and large SUVs are used for many years in harsh environments. In addition, because these vehicles are heavy, the hub units supporting the wheels are required to be highly durable. Hub units using tapered roller bearings mounted on such large vehicles traditionally have a separate inner ring and shaft. JTEKT, however, has developed an integrated 3rd generation tapered roller hub unit in order to respond to the needs for higher performance and reliability. We became the first Japanese manufacturer to achieve mass production of such hub units.

#### Evolution into lightweight 3rd generation with less CO<sub>2</sub> emissions

In order to advance the tapered roller hub units for large vehicles to a lighter and less energyconsuming 3rd generation product, JTEKT started developing prototypes independently in 2003. Our efforts paid off, and in 2009 we began to develop a product for pickup trucks of an American carmaker.

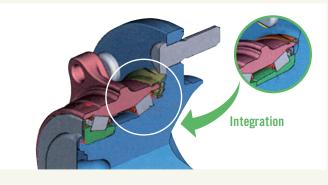
"This is the first product by JTEKT and first mass-produced product by a Japanese manufacturer. We repeated the process

of trial and error, especially on shaft design and assembly methods, and checked more than 1,000 patents. Everyone in related departments worked together to create a high quality product." To raise design accuracy, we verified the design from various aspects such as forging and heat treatment with the help of the Production Engineering Department, Production Department, and others. As a result, the new product has achieved 20 times the shaft strength and a 600 g. weight reduction compared with conventional products that have a separate inner ring and shaft.



#### Genuine contribution from a long-lasting product that withstands harsh environments

Seals (\*1) are important components that withstand harsh climates from extreme cold to heat, and contribute to the long service life of a hub unit. For this



development, to prevent muddy and salty water from entering the inside of bearings, we have achieved twice the sealing performance compared with conventional products. In addition, we have optimized seal design and reduced energy loss by 50% through the adoption of LFT (\*2), JTEKT's original technology. The new product that launched mass production in December 2013 is used for the pickup trucks of an American carmaker.

"Creating a product that is safe to both drivers and passengers, and is at the same time long-lasting, is the major premise of contribution to the environment. We therefore extensively pursued weight reduction and decrease in energy loss. I, as an engineer, would feel happy if cars using our hub unit are driven comfortably by people around the world 10 years from now".

 $\ast 1$  A sealing device that prevents foreign particles from entering the inside of the bearing and grease from flowing out

 $\ast 2$  Ultra-low friction torque tapered roller bearing with reduced friction load



### PICK UP Building Value

### KEYWORD

### Large Size Bearing Engineering Development Center

JTEKT's bearings are used in areas other than the automotive field, such as wind power generation, railroads, and iron/steel. In the past, we tested large bearings used in these industrial machine fields utilizing models of reduced size, and asked our customers to evaluate them on actual machines. As such, unexpected problems occurred, resulting in lengthy development times. In order to solve these issues, JTEKT has established the Large Size Bearing Engineering Development Center, where large bearings are evaluated and analyzed in-house. The center is currently in full operation.

#### Bearings with higher reliability for wind power generation and high-speed railroads

The features of this center allow bearings to be evaluated in environments with not only the bearing itself, but also the surrounding structures included, creating environments similar to actual machines. An evaluation testing machine for ultra-large bearings made for wind power generation, installed in 2012, includes a housing that fixes the bearing for performance evaluation. We are now able to not only verify durability, but also propose optimal housing

#### design.

A testing machine for bearings made for high-speed railroad vehicles, installed in 2013, can simulate motion up to 500 km an hour. This machine allows us to simulate actual impacts such as curbs and rail joints to check their effects, and develop bearings that suppress temperature rise due to high-speed wheel rotation.

"There is no other bearing manufacturer that possesses this much equipment for actual machinebased evaluation of large bearings. The enthusiasm of our production staff in improving technological capabilities to create higher quality products led to the establishment of the center". (Ootsuki)

### Accumulating evaluation data for further advancement

In 2014, we plan to install an evaluation testing machine for bearings made for iron and steel production equipment. We will evaluate the durability of bearings that are used in harsh environments such as exposure to high temperatures and water, and develop products with long maintenance intervals to assist high-efficiency production. In addition, we plan to verify the adequacy of materials and utilize the results





Evaluation testing machine for ultra-large bearings

### for material development.

"Accumulating evaluation data at this center improves computer analysis accuracy and leads to the development of products with high added value, such as those with short development periods and sensor bearings (\*). Reduction of energy loss and the long service life of industrial machines as a result of improved bearing performance will contribute greatly to achieving a sustainable society. We will use this center to its fullest, accelerate the optimi-



Testing machine for bearings made for high-speed railroad vehicles

zation of internal design and materials, and strive to advance large bearings even further". (Kajihara)

\* A bearing with a sensor function that automatically detects bearing condition.

#### Address

8-11 Kokubuhiganjo-cho, Kashiwara, Osaka

Total investment Approximately 2 billion yen (including the building) Evaluation equipment

- Evaluation equipment
  Evaluation testing machine for ultra-large bearings
- (installed in February 2012)
- ② Testing machine for bearings made for high-speed railroad vehicles (installed in March 2013)

Scheduled to install an evaluation testing machine for bearings made for iron and steel production equipment in October 2014.

Bearing Operations Headquarters Experiment & Analysis Dept. Kazuhisa Kajihara (left)

Bearing Operations Headquarters Experiment & Analysis Dept. Experiment Office 2 Group 1 Masaaki Ootsuki (right)

Evaluating bearings in environments similar to actual machines to provide high added value

### **Building Value**

General purpose cylindrical grinder GE4i

→ E\_09 Related article





General purpose cylindrical grinder GE4i

The environment surrounding *monozukuri* in Japan is changing due to a decrease in the working population, shift to overseas production, and retirement of skilled technicians in the baby boomer generation. To respond to these changes, JTEKT has redesigned the general purpose cylindrical grinder, our main product, for the first time in 20 years. The newly remade GE4i model began sales in March 2014. Since grinding is a process that once heavily depended on the intuition, knowhow, and experience of skilled technicians, our aim in the development of this product was to create a grinder that allows less experienced technicians to achieve stable machining accuracy.

### Obtaining hints for advancement by asking customers

When developing a new product, we begin by asking our customers for their opinions, which gives us valuable hints.

"We heard from multiple customers that dimensions were inconsistent when they grinded at the start of work or after a lunch break. Our team discussed possible factors and countermeasures, and decided to create a machine insusceptible to heat."

Various types of heat, such as room temperature, heat generated by machining, and motor/pump heat, build up in and around machines. Machine distortion caused by such heat affects machining accuracy.

"Skilled technicians intuitively perceive heat-induced changes and slightly adjust the grinding amount, resulting in consistently high accuracy. We can think differently: If machine distortion due to heat is reduced, lessexperienced technicians can perform high accuracy machining. This was our key point in development."

### Improving operability and installing many safety and energy-saving measures

A project team that included employees of group companies conducted a series of discussions, experiments, and computerbased analyses to achieve shapes and arrangements insusceptible to heat for various parts. In addition, we have improved accuracy by installing a contacttype sensor. Dimension change when restarting operation has been reduced by approximately 93% compared with conventional machines. We have also adopted beginner-friendly designs such as a function that enables operation through minimum data input, as well as operation buttons in multiple languages and with icons. We have also employed many safety and energy-saving measures, as they have become increasingly important at production sites in recent years.

"We continue to contribute to *monozukuri*, improving technologies and assisting our customers in performing high accuracy machining."



Multistage continuous grinding



USEI-ITIETIUIY ITIATIUAI ITATI

At the start of work, after a lunch break, etc. Dimension change at the restart of operation Compared with Nenventional Approx. 93° reduction

### CSR Report 2014

### PICK UP

### **Building Value**

### CNC grinder with a built-in sizing unit TOYOPUC-GC70



Energy conservation is an important issue at the sites where grinding is performed. JTEKT has developed a product that combines two devices generally installed separately, thereby achieving energy conservation within grinders. We have also succeeded in producing various effects such as resource saving, high speed, and improved operability.

### Product that can be developed only by JTEKT

When performing high accuracy grinding, a measuring device called a sizing unit plays an important role. The sizing unit consists of a head that measures the dimensions of a workpiece, and an amplifier that amplifies and computes data received from the head and sends them to a CNC (Computer Numerical Con-

trol) device. JTEKT has developed a product consisting of an amplifier built into a CNC device. Power consumption has been reduced by uniting a device that consisted of two parts into one. In addition, less steel is used since an amplifier holder is no longer necessary. Furthermore, various advantages such as high speed have been obtained due to short transmission time between Can confirm both NC and sizing data simultaneously on one screen. Unified data management Sizing data NC data

devices and improved operability as a result of combining two screens into one.

"I am proud to say that this development could be achieved only by JTEKT because we manufacture both sizing and CNC devices in-house. We continue to pursue the status of Only One and establish superior performance control systems based on higher speed and accuracy so that we can better serve our customers."

**Power consumption** % Compared with conventional **DO** less Approx Steel saved due to the removal of the amplifier 46.7kgholder



Hiroshi Imaike

# Aiming to develop new products that contribute to the happiness of our customers

**CBN** wheel Tough Vi-F

Improving sharpness to respond to the needs for high accuracy and energy conservation

Grinding a camshaft, an engine part, requires high accuracy. There are growing needs for productivity improvement and good machining surface quality, and a CBN wheel is a key part in responding to these kinds of expectations. CBN abrasive grains that have diamond-like hardness are used around the edge of a metal



disc. Toyoda Van Moppes Ltd., a JTEKT group company, has developed a new CBN wheel. By improving sharpness, we have reduced grinding power by approximately 10%, resulting in energy conservation, and have also improved grinding efficiency by approximately 1.6 times, compared with conventional products. The



CBN camshaft grinder GC20Mi

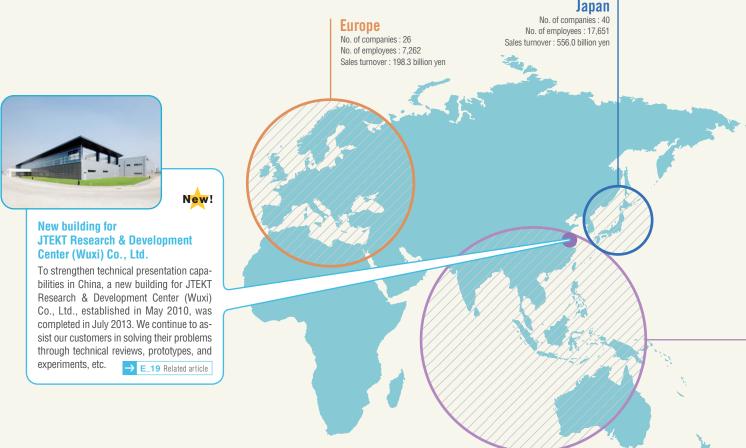
service life of the wheel is about twice as long, contributing to tool cost reduction. This CBN wheel is used for JTEKT CBN camshaft grinders. JTEKT group companies work together to meet the needs of our customers.

#### Toyoda Van Moppes Ltd. Head Office & Plant 1-54 Shiroyama, Maigi-cho, Okazaki, Aichi Date founded April 26, 1975 Number of employees 285 (as of end of May 2014) **Business** activities Manufacture and sale of diamond tools Energy consumption % Grinding power Compared with conventional reduction Wheel service life times Compared with conventional longer **Grinding efficiency** times Compared with conventional **D** higher

# Building Excellent Products

JTEKT's *monozukuri*. Ahead lay the world, with global environment as the background. With a firm eye on both, JTEKT engages in *monozukuri* towards shaping a better future.

### Global production framework Enabling competitive *monozukuri* anywhere in the world



### Global management framework and assurance of quality for customers

The JTEKT group assigns directors to six major regions in the world to streamline its global management framework: North America, Europe, China, ASEAN, India, and Central/South America. The "establishment of a global standard line" that we have been working toward since FY2010 aims to share management systems developed in Japan, including standardization of lines and personnel development, with our overseas Group companies so that we can conduct monozukuri around the world, maintaining the quality and cost that our customers expect. We hope to contribute to stable local employment, local personnel development, and community revitalization by establishing regional management, assuring quality for customers, and strengthening the production framework.

### Enhancement of New! the supply framework

JTEKT believes that laying out a framework that can provide customers with products quickly and reliably is an important responsibility of all manufactures. In FY2013, we started local production of electric power steering in Brazil and established a production base in Mexico.

Starting in FY2014, we have been



promoting group and global management centered on our three operations of automotive components, bearings, and machine tools and mechatronics, based on the new Mid-term Management Plan.

### • Employee percentage by location (Current as of end of March, 2014)



For automotive operations in particular, we continue to enhance product appeal and our supply framework in the world market in order to maintain the No. 1 share in steering.

### PICK UP **Building Excellent Products**

### **Establishment of** a production base in Mexico

### New!

JTEKT has established its first production base in Mexico. We have streamlined a system that can respond quickly and appropriately to the needs of our customers in Mexico, a country into which many carmakers are expanding these days. We

aim to contribute to the development of the automobile industry in Mexico.

North America No. of companies : 17 No. of employees : 5,881

Sales turnover 247.5 billion yen

Asia Oceania Other

No. of companies : 57 No. of employees : 12,662 Sales turnover 258.1 billion ven

### Start of local production of electric power steering in South America

To respond to increasing demands in the growing market of the South American region, JTEKT began local production of electric power steering (EPS) in Brazil in February 2014. In addition to the technical center and test course established

in 2012, we have strengthened the framework that can quickly respond to local customer needs.



New!

### Energy conservation in production facilities Measures focusing on heat treatment furnaces with high energy consumption

### Installing in-house power generation facilities at five plants

JTEKT requires a lot of energy in the process of monozukuri, and considers energy conservation within production facilities an important issue. With the aim to save energy, contribute to peak shaving, and establish a structure that allows continued production in an emergency, we promote the installation of in-house power generation facilities, including cogeneration. Taking measures in response to planned power outages and power restrictions has become an important issue after the Great East Japan Earthquake. We are installing such facilities within JTEKT plants, particularly those with heat treatment furnaces, which require continuous operation. Six facilities are operating at five plants in Japan, and our overall in-house power generation percentage (\*) has risen steadily to 16.2%.

### Making improvements based on data gained through "visualization"

Heat treatment furnaces require a lot of power and currently account for approximately 30% of JTEKT's overall power usage. This means that reducing energy consumed by the furnaces will lead to significant results, and we are therefore focusing on the furnaces.

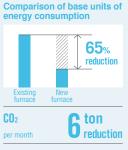
To achieve "visualization" of energy used, we have already installed eco-power meters, which automatically measure power, to major lines at all plants. Starting in 2013, we systematically modify and repair heat treatment furnaces requiring attention, which are selected based on the collected data. Furthermore, each plant devises ways to save energy, and successful cases are shared with other plants.

The ratio of in-house power generation capacity to peak power in FY2010

#### New! Installing a new furnace that balances energy conservation and quality improvement

In 2013, the Kokubu plant installed a new type of heat treatment furnace called the "straight through furnace". While developing this furnace, we incorporated the technology of Koyo Thermo Systems Co., Ltd., a group company. This new furnace, developed through the cooperation of the JTEKT group, greatly conserves energy and improves product quality. We have strengthened our production framework to fit the age of "emphasis on quality" and "high variety, low volume".





# Building Professionals

About CSR. About the next generation of JTEKT. About workplace environment. We feel it will be important in the coming future to promote the development of professionals who think from multiple perspectives and act on their own.



Naohiko Itani

I act in a way that

I can be proud of!

Tadanobu Ishibashi



**IESSAGE FR** 

Koyo Sealing Techno Co., Ltd. Junji Sugimoto Takeshi Minami Daibea Co., Ltd. Toshihiro Kimura

Rika Hayashi

### Spreading CSR throughout group companies Under the JTEKT GROUP VISION, We will further promote CSR within all our group companies

Activities for familiarizing CSR within our group companies began in 2008. We have continued to hold periodic meetings since the establishment of the CSR committee in FY2012. Starting in FY2014, we have been strongly promoting CSR within all our group companies, under the ideas of the JTEKT GROUP VISION and the Mid-term Management Plan. On this page, we introduce comments reported from domestic and overseas JTEKT group companies and employees about activities, enthusiasm, and feedback related to CSR.



Kenji Murohashi

Akihiro Okuyama

I put my heart into

explaining our CSR

as plainly as possible in order to spread the idea throughout the company.

#### **KEYWORD**

### PICK UP

### **Building Professionals**



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### PICK UP **Building Professionals**

### **Global HR** $\rightarrow$ P12 Related article $\rightarrow$ S\_07 Related article **Organizing HR** development and assignment beyond countries and regions

### HR development and assignment on a global basis

Global expansion of JTEKT is progressing as the ratio of the sales structure and employees now exceeds 50%. We will put a stronger emphasis on the optimization of human resource (HR) development and assignment throughout all countries and regions.

As one of the pillars of our policies, we will introduce the Global Succession Plan in order to proactively develop and appoint personnel who will assume key roles in the next generation JTEKT group at overseas locations.

In Japan, by predicting future challenges in addition to the existing training programs, we have introduced problem solving programs aimed at developing HR



who can think and act on their own, and introduced a technical career development program to enhance the development of monozukuri personnel. We are putting great efforts into organizing the training and education system, and plan to expand our programs worldwide in the future.

#### **Global HR meeting** Sharing policies for the coming five years

On December 3rd and 4th, employees in charge of HR at the six main overseas regions and Japan gathered to hold the first ever global HR meeting in Kariya, Aichi. After speeches from our President Tetsuo Agata and Executive Vice-President Takaaki Suzuki, discussions on HR management and development were held over the course of two days, in which policies were shared. We will be holding the meeting once a year to promote HR management on a global basis.



New!

### Intra-company CSR familiarization $\rightarrow$ S\_09 Related article Creating opportunities for every employee to think about the connection between work and CSR

### Distributing a new tool for spreading CSR to all employees

Since FY2011, a CSR report has been distributed to all employees and study sessions held at each workplace. In FY2013, a leaflet "CSR+YOU: Notes about your social responsibilities" was newly created and distributed to all employees along with the CSR report. The leaflet is organized so that employees can think and write about the connection between their work and CSR. Results reports about the study session include comments such as "it was a good opportunity to think back about the rela-

tionship with our stakeholders". and "it is important to continue having discussions".

### **Continuing inspections** concerning the comprehension of CSR policy

The results of the CSR policy comprehension survey in the workplace management questionnaire showed that in FY2013, 82% of employees in administrative positions and 38% of general employees understand the CSR policy. We feel it is necessary to implement further familiarization activities.

Percentage of people who "understood CSR satisfactorily" and "understood really well"

	FY2011	FY2012	FY2013				
Managers or above	64%	79%	82%				
General employees	26%	36%	38%				
All employees	35%	43%	45%				



### Safety training and education → S\_10·11 Related article Install a safety dojo within all plants and continue implementing steady activities

### A place to experience the importance of obeying work rules

In recent years, JTEKT has been putting efforts into completely eliminating workplace accidents, especially "Failure-to-Stop" Accidents (\*1). In FY2013, JTEKT proceeded to install a "safety dojo" in each plant. A safety dojo is an educational facility where participants can experience simulated accidents on actual machines and feel the importance of obeying work rules. Installation of a dojo was completed in all plants as planned, and training was conducted for all employees who may possibly enter plants, including administrative personnel.



### Analyze accident cause and further enhance countermeasures

Workplace accident countermeasures were enhanced in FY2013, but very unfortunately, one nearfatal accident occurred, and the

N	e	w	Į

Trend of workplace accident rate

Number of all accidents	17	17	30
Near-fatal accidents (accidents corresponding to disability grades 1 through 7)	0	0	1
Lost worktime accidents (accident requiring one or more days of lost worktime)	7	4	6
No lost worktime accidents (accident requiring less than one day of lost worktime)	10	13	23
6 Major Accidents (*3)	6	7	14
Failure-to-Stop accidents	4	6	13

number of Failure-to-Stop accidents greatly increased compared to FY2012. We take these results very seriously and will steadily analyze causes and enhance countermeasures to achieve zero accidents. We have already started improvements for the near miss (\*2) proposals that we have been promoting. Not only have we been accepting proposals and implementing improvements, but we have also started creating opportunities to proactively hear suggestions and conduct improvements.

\* 1 Accidents which occur when troubleshooting work or repairs are conducted without first stopping the machine.

\* 2 A safety and health activity involving the gathering and sharing of information on close calls and the devising of reoccurrence prevention measures

\* 3 Accidents arising through pinching/entanglement, heavy objects, vehicles, falling, electric shock and hot

# Disaster Recovery Support

JTEKT places the remembrance of the 2011

Great East Japan Earthquake and the continuation of support for the disaster areas as one of the pillars for social contribution activity. We will continue support activities for the devastated areas.

