Feature: The History of KYB and Its Businesses

KYB's current businesses have been built on the creativity and tireless technological exploration of the development people who have followed in the footsteps of founder Shiro Kayaba. As we strengthen our foundation for further rapid growth, we take a look back at KYB's progress over more than 80 years and the origin of its *monozukuri* (Japanese manufacturing expertise).

Our Founding DNA

KYB Began with the Creativity of Its Founder and His Tireless Pursuit of Technology.

A search for the origins of KYB's advanced technologies and corporate philosophy leads back to founder and inventor Shiro Kayaba. At the age of 21, he founded the Kayaba Research Center (which celebrated its 100th anniversary on November 19, 2019) and used cutting-edge hydraulic technology and creativity to invent and develop practical applications for takeoff and landing equipment including for aircraft carriers. The hydraulic buffers (oleo struts) that he developed for aircraft takeoff and landing equipment became the basis for KYB's vibration control technology,[1] a precursor to automotive shock absorbers and other products. The metal plating of oleo struts on the sliding components of a Japanese Zero fighter plane discovered on the bottom of Japan's Seto Inland Sea in 1977 was still shiny after more than 30 years underwater, demonstrating the sophistication of KYB's technologies in the 1940s.

Furthermore, KYB's hydraulic components for aircraft control systems greatly improved control that until then had relied on physical force, thus helping to lessen the burden on pilots. Kayaba's hydraulic technology subsequently evolved into the power control technology[2] central to modern construction machinery and industrial cylinders. Today, products that use KYB's core vibration control and power control technologies account for the majority of sales.

Shiro Kayaba's spirit of creative development and advanced technology were the driving force behind KYB's establishment and remain part of the Company's DNA today.

Notes: 1. Technology to absorb and mitigate shock and vibration
2. Technology that transmits and controls a large amount of power with a small amount of force

An Independent Company with an Enduring Spirit of Freedom and Creativity

KYB has been an independent company unassociated with any larger corporate group throughout its 84-year history.

History

November 1919	Founder Shiro Kayaba established Kayaba Research Center
January 1927	Kayaba Seisakusho established
March 1935	Kayaba Manufacturing Co., Ltd. established
November 1948	Kayaba Industry Co., Ltd. established
October 1959	Company stock listed on the Tokyo Stock Exchange

Shiro Kayaba (circa 1945)

Selected List of Kayaba Award Recipients

Promotes the Development and Commercialization of Product Applications

1975
Kayaba Award established one year after the death of founder Shiro Kayaba
Development of an embarkation ramp
Development of a compact internal position control valve

1976
Development of an electronic control system (ECS) for linear lock stitching

1978
Development of a one-chamber air-type front fork

This product absorbs more shock and delivers better ride quality and handling stability than a conventional product by combining an air spring with the metal spring in the chamber to generate counterforce. KYB was first in the world to develop this type of product, which has been adopted for use in motocross bikes and also in large street motorcycles with upright front forks.

1979
Development and application of a motorcycle suspension simulation system

Shiro Kayaba imbued the company he founded with the basic tenets of vitality, love and creativity. Our independent perspectives and ideas give us the will to respond flexibly to customer issues and contemporary needs. For example, in the automotive industry we have co-developed and proposed a large number of products to ensure a safe and comfortable ride. Deploying this strong independence, we have acquired unmatched experience and technologies by collaborating with a wide variety of manufacturers.

Shiro Kayaba stated that ultimately, the ability to deliver quality with exceptional reliability supported by technological capabilities is the result of the cumulative knowledge and efforts of individual employees on the manufacturing floor. In other words, it comes from manufacturing skills backed by boundless energy. Our founder believed that the development of new technologies was the basis of KYB's growth, and his spirit has been the force driving us to become the leader in hydraulic technology. The ambitions of our founder live on in our Corporate Spirit and Management Vision, and remain the foundation supporting the KYB Group.

Our Pioneering Spirit of Development Opens the Door to the Future.

Our founder considered the development of new technologies to be the basis of corporate development. Following his death, in 1975 we embodied this philosophy in the Kayaba Award, which is given to employees who make remarkable achievements from a creative perspective in the area of technological development.

Adjustable damping force shock absorber with a proportional solenoid

A vane pump now widely used as a component in continuously variable transmissions (CVT) for vehicles received the Kayaba Award in 2004. The hydraulic pressure from the vane pump enables smooth gear shifting. An important component that determines fuel efficiency, the vane pump addressed a variety of needs, including space saving, high efficiency, low noise and low cost, in addition to fundamental performance. We also completely renovated our production line to install the vane pump inside the transmission, which thoroughly eliminated contamination.[3] As a result of our commitment to quality, as of 2015 we had achieved cumulative production of approximately 20 million CVT vane pumps with zero complaints. The 2017 Kayaba Award went to the development of an adjustable damping force shock absorber with an external proportional solenoid. This computer-controlled shock absorber optimizes the attitude of automobiles. The use of a proportional solenoid as the actuator allows the shock absorbers to control attitude according to driving conditions eight times faster than conventional shock absorbers that use a stepping motor.

Note 3. Extraneous material left over from the manufacturing process or caused by wear inside the product.

Adding Greater Value to Products

1981
Development of a new suspension for the 82MX model

1983
Development of an automated production line for large valves

1986
Development of a high-capacity actively controlled suspension (HICAS) system

In addition to steering the front two wheels, this system predicts vehicle behavior based on vehicle speed and steering angle to improve stability at high speeds. It changes the position of the front and rear tires according to steering. Hydraulics have now been replaced with electronics using the knowledge gained from HICAS to develop its successor, a rear active steering actuator that uses an electric actuator for the rear steering rack.

1987
Development of a cut card-type direct jacquard machine

1989
Development of a hydraulic active suspension for passenger vehicles

Use of Composite Technology

1992
Development of an unmanned production line for PV shafts

1996
Development of a semi-active suspension system for railroad equipment

This system contributes to a comfortable ride for railroad cars using electronic control to optimally adjust the damping force of railroad oil dampers according to car vibration. Highly rated by customers, this system attracted attention as the world's first such technology for mass-produced railroad cars.

1999
Development of the KVMG-200H control valve

2000
Development of a lightweight, high-performance front fork for extreme-performance sports motorcycles

This product brings together several new and outstanding technologies, including titanium ion plating on the inner tube sliding surface to improve front fork performance, and the world's lightest titanium alloy bolts, with significant advantages over competing products.

2001
Development of 4KW2 and 4KW3 power steering pump products and associated production line

2002
Development of diamond-like carbon (DLC) coating
Development of a semi-active system using a proportional electromagnetic relief valve for railroad equipment

Pursuing New Dimensions of Performance

2004
Development of a vane pump for use in CVTs

2006
Achievement of sophisticated performance for suspensions used in extreme-performance sports motorcycles

2009
Development of the 7K vane pump for use in CVTs in light and compact automobiles

2010
Development to reduce oil leakage from seals

2017
Development of method for mass-producing adjustable damping force shock absorbers with an external proportional solenoid

Given the growing market for adjustable damping force shock absorbers with a proportional solenoid, we developed a method for mass-producing them with a small, external individual damping control unit (IDC) that delivers excellent performance and ease of installation. We expect the product to be adopted in an increasing range of vehicle models because of its responsiveness and damping force range are superior to competing products and because of its ease of installation.

Evolution into a Comprehensive Hydraulic Equipment Manufacturer

From the Automobile Shock Absorber Market to the Special-Purpose Vehicle Market

KYB has always valued joint development with manufacturers. Shortly after World War II, we started jointly developing shock absorbers with two Japanese automakers. Japanese cars at that time were not equipped with shock absorbers, so we researched multiple prototype iterations to improve driving performance and durability. Our success led to orders for 4,000 shock absorbers for the jeeps of the U.S. occupation forces in Japan in 1948, and we began full-scale production of shock absorbers for domestic automobiles.

The products we delivered excelled in functionality, durability, and cost, so they were fully adopted in domestic passenger cars in 1955 and our market share grew to over 75%.

We subsequently deployed original technology in automotive hydraulic equipment in markets for special-purpose vehicles such as U.S. military trucks and large dump trucks and concrete mixer trucks used for construction, which are customized with a wide range of equipment.

Rapidly Extending Our Acclaimed Technology into New Markets

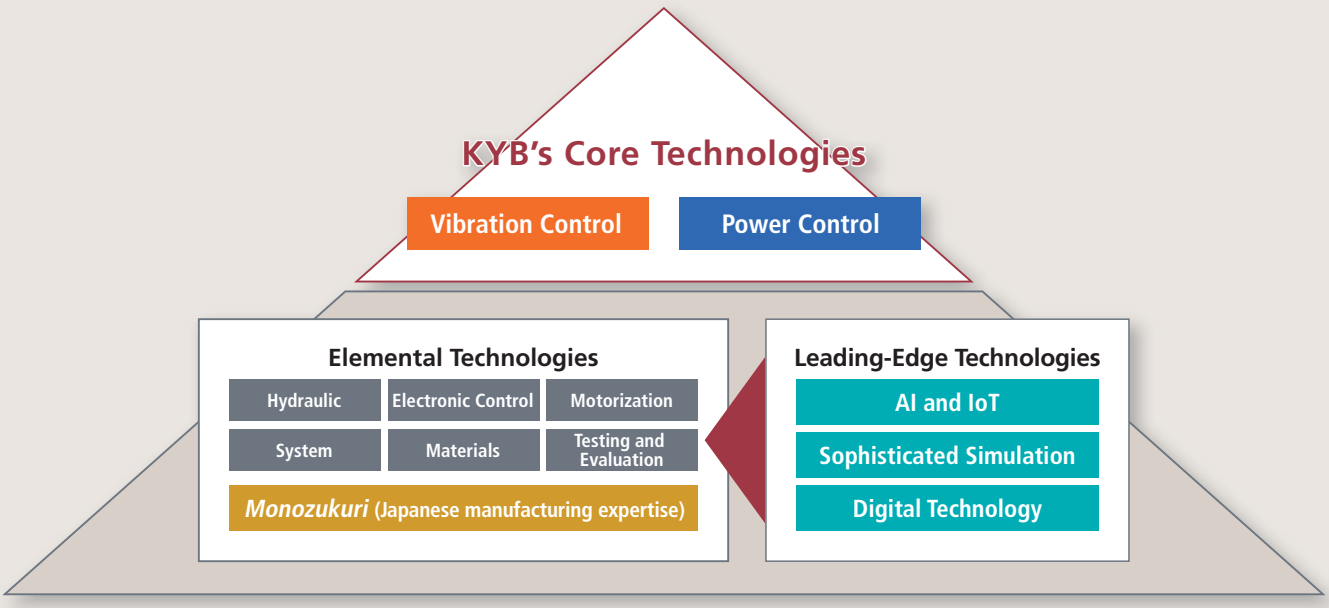
After World War II, KYB laid its foundation as a hydraulic equipment manufacturer by expanding into hydraulic oil presses and hydraulic jacks for automobiles. Due to their controllability and functionality, KYB's hydraulic jacks have been used in a wide range of applications including aircraft maintenance, civil engineering and construction, ship hatches, and lifting work.

In 1951, we began collaborating with Japan National Railways (JNR), now Japan Railway (JR), to develop oil dampers for railroad cars. The equipment we developed, which was similar in appearance to the shock absorbers for large four-wheeled vehicles, demonstrated superior railroad car speed, ride comfort and cost performance compared with the dampers then in use, which combined several types of springs. As a result, all JNR railroad cars built from 1952 onward used the product we developed. Its use subsequently expanded to JNR's diesel railroad cars, and to private railroad companies.

In the railroad equipment business, our steering dampers and pantograph hydraulic shock absorbers have a dominant market share. The technologies we have evolved and the strong and diverse customer base we have built, which includes major automobile, motorcycle, and construction machinery manufacturers, have become our strengths.

KYB's Technologies

KYB works to improve people's quality of life by solving societal issues through the use of a wide range of technologies that it has cultivated over many years based on its core technologies, and by combining these technologies with AI, IoT and other leading-edge digital technologies.



KYB's Advanced Technology for a Better Future

Precision hydraulic technology is essential for safety, reliability and comfort. KYB has continued to refine this technology since its establishment, leveraging vibration control to supply shock absorbers for automobiles, suspensions for motorcycles and power steering; and leveraging power control technology to supply components such as valves, pumps, hydraulic cylinders, actuators and reservoir modules for construction machinery, industrial vehicles, railroad cars and aircraft, as well as reservoirs for space rockets. Few companies worldwide offer this range of elemental technologies.

Control technology that combines suspension and steering is key to achieving autonomous driving. KYB is involved in both of these areas, and has been developing and using electronic control technology since the late 1960s. Two of KYB's key features are its system development capabilities including software for applications such as electric power steering and active suspension, and its in-house production of electronic control modules.

New Technology Initiatives for Autonomous Driving

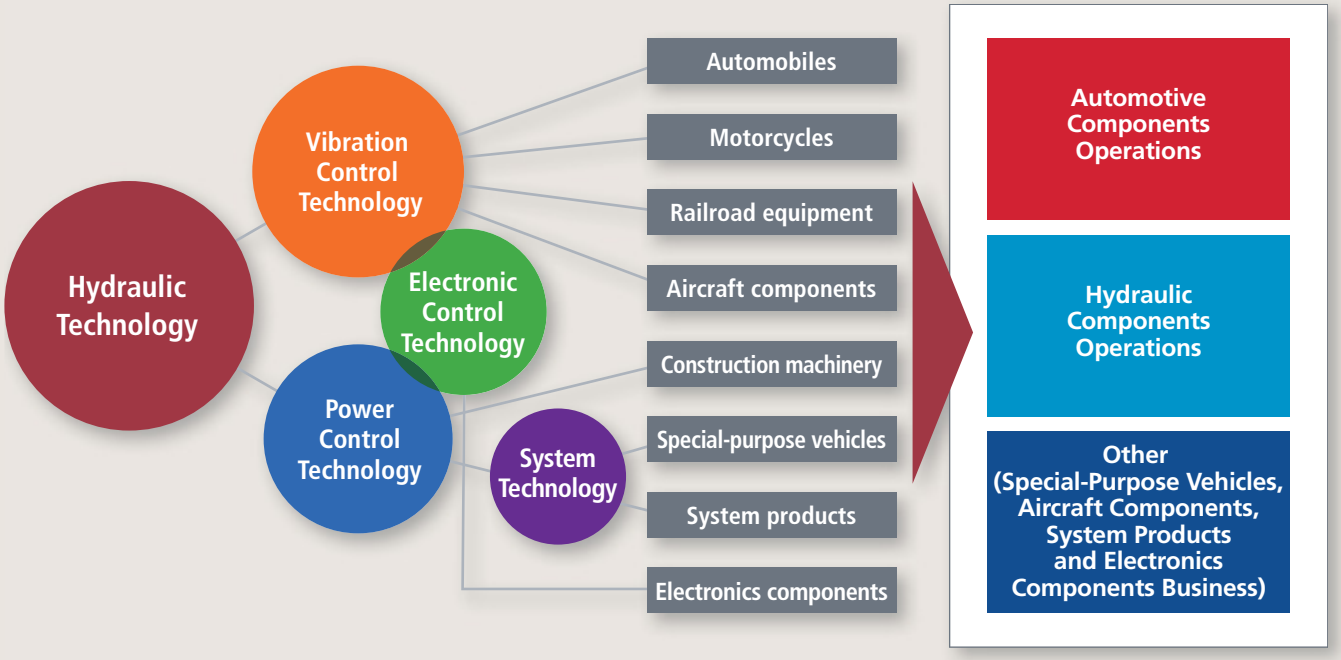
The use of lane keep assist systems (LKAS) to support autonomous driving is increasing, so we have developed electric power steering that can be equipped with LKAS to flexibly operate in-vehicle systems.

We have begun developing electronically controlled pumps to address needs in operating agricultural and construction machinery, for which autonomous driving is becoming practical. We are miniaturizing the electronic servo to meet demand for computerized design and autonomous operation of vehicles in which space for installation is limited.

To support autonomous operation of construction machinery and application of IoT, we have also begun developing electronic control valves for 20-30 ton excavators. We are miniaturizing the electronic control portion to allow installation with no additional space requirements.

KYB's Core Technologies and Businesses

KYB combines system, electronic control and other technologies with its core vibration control and power control technologies to supply products to customers in a wide variety of fields.



Global Expansion

Creating Production and Sales Bases Worldwide

Another KYB strength complementing its hydraulic technology portfolio is its global network of production and sales bases. Quick to expand overseas, KYB formulated a long-term Management Vision in 1966 with the goal of becoming a comprehensive global hydraulic equipment manufacturer. In 1973, we moved to accelerate operations outside of Japan by establishing overseas headquarters to respond to international expansion among customers and improve the product export ratio. Centered on shock absorbers, the KYB brand gained popularity overseas as a result, and in 1981 our export ratio exceeded 10.1% and the value of exports exceeded ¥10 billion.

In 2002, we established a wholly-owned subsidiary, KYB Industrial Machinery (Zhenjiang) Ltd. (KIMZ) as a production and sales base for automobile shock absorbers in Jiangsu Province, China. In 2004, we established KYB Hydraulics Industry (Zhenjiang) Ltd. in Jiangsu Province as our first overseas production base for Hydraulic Components Operations. In the same year, we also established KYB Technical Center (Thailand) Co., Ltd. for technology development in Thailand. Thus we created a global development network spanning the four regions of Japan, the United States, Europe and Asia, enabling development that meets the unique needs of local markets.

Manufacturing the Best-Designed, Highest-Quality Products Worldwide

The Developmental Experiment Center test track

KYB has the third largest[4] share of the global automobile shock absorber market. Currently, we have 38 production bases, five research and development bases, and 35 sales bases in 23 countries. We provide products, technologies and services in the United States and Europe, and in the leading emerging economies of Brazil, Russia, India and China, as well as other emerging countries such as Vietnam, Indonesia, South Africa, Turkey and Argentina.

Moreover, we established the Developmental Experiment Center in Gifu Prefecture in 2011 to create high-quality products that meet the needs of the regions we serve. On its expansive site, we have built a large-scale test track that reproduces road surface conditions around the world, allowing simulations and road tests with actual vehicles to develop better products.

We will continue to challenge the status quo by pressing forward with the creation of high-value-added products to achieve stable sales and increase profitability unaffected by market fluctuations.

Note 4. Source: KYB data (As of March 2019)

Key Milestones Overseas

1974

Sales subsidiary established in the United States

Chicago Office established in 1972, and sales subsidiary KYB Corporation of America following feasibility study of entering the U.S. market.

1987

Shock absorber manufacturing subsidiary established in the United States

Kayaba Industries established as a production base for shock absorbers in response to the rapid appreciation of the yen and the entry of Japanese automobile manufacturers into the United States.

1996

Joint venture established in Spain to manufacture hydraulic components for automobiles

First production and sales base established in Europe for vane pumps for power steering through a joint venture with ArvinMeritor, Inc..

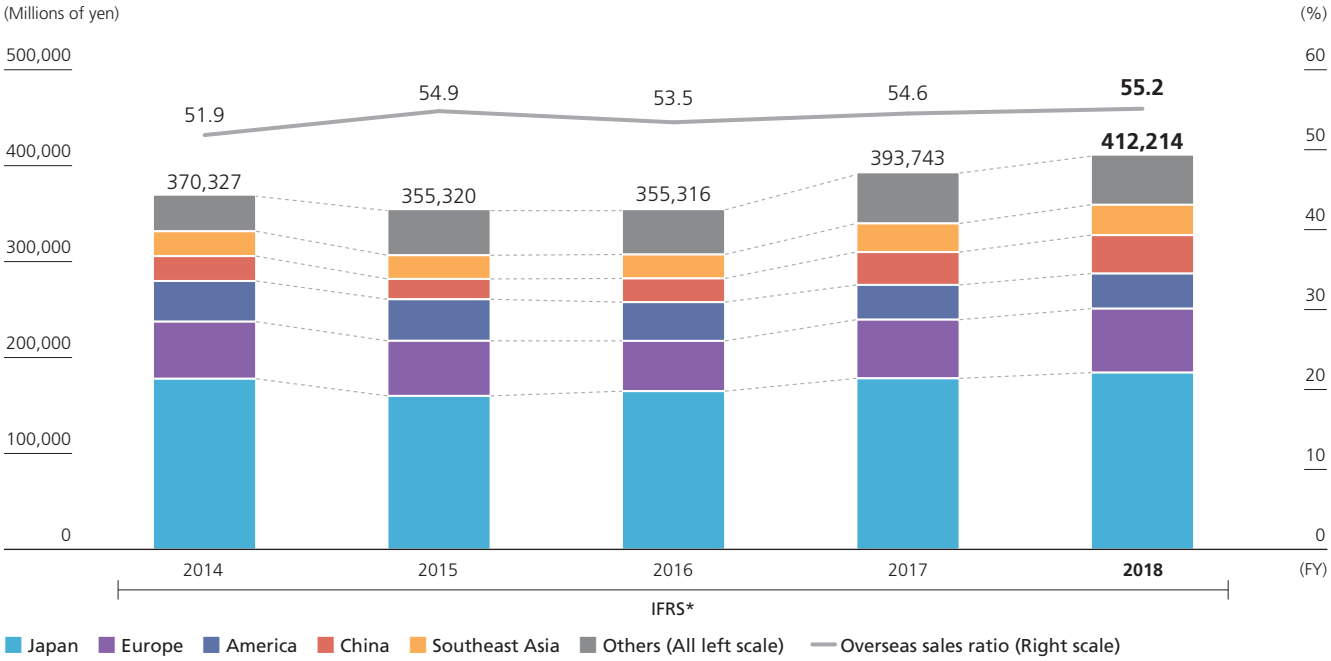
2002

Automobile shock absorber manufacturing subsidiary established in China

Wholly-owned subsidiary KIMZ established as a production and sales base for automobile shock absorbers. Mass production started in 2004.

The KYB Group by the Numbers

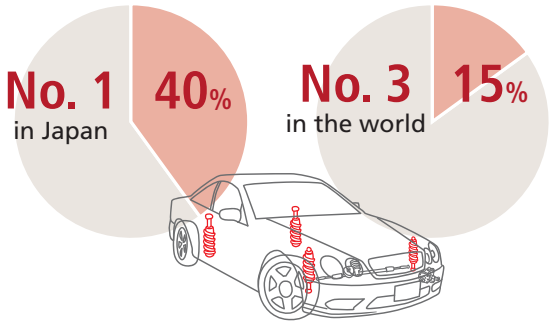
Net Sales by Geographic Region and Overseas Sales Ratio



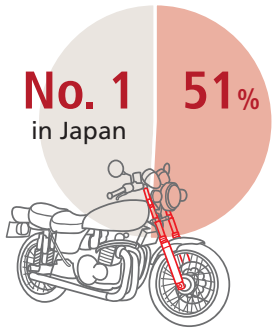
* International Financial Reporting Standards

Market Share of Major Products

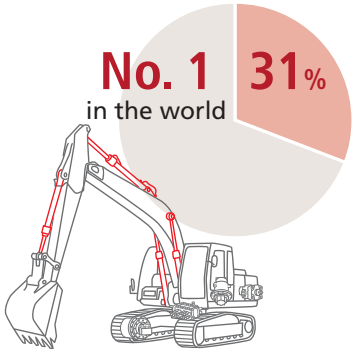
Shock Absorbers



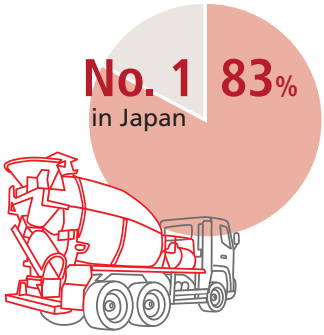
Motorcycle Front Forks



Hydraulic Cylinders



Concrete Mixer Trucks



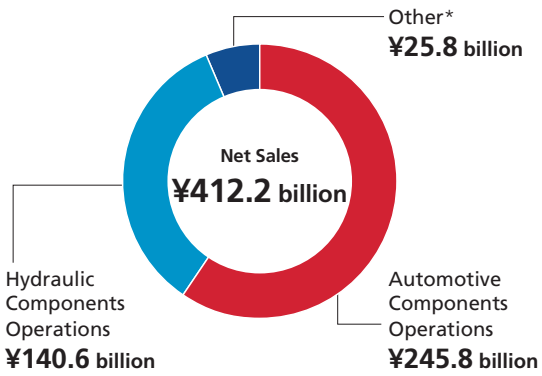
Source: KYB data (As of March 31, 2019)

KYB Group Business Activities

Business Overview

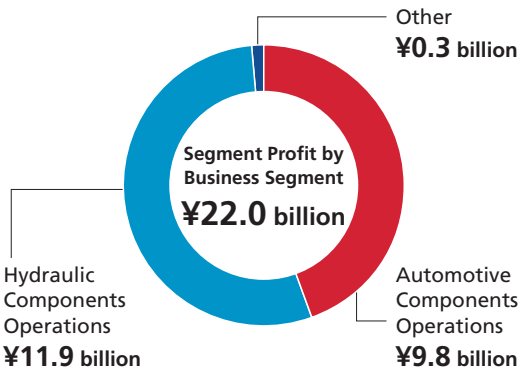
Since its establishment, KYB Corporation has offered a variety of products with hydraulic technology at their core based on a spirit of creative development. We will continue evolving to deepen the trust and support we have gained from customers around the world through product development that integrates technologies including vibration control, power control, systems, and electronic control.

Net Sales by Business Segment



* "Other" includes special-purpose vehicles, hydraulic equipment for aircraft, system products and electronics components not included in the other two reportable segments.

Segment Profit by Business Segment*



* Segment profit corresponds to operating profit in JGAAP.

Main Businesses

Automotive Components Operations

Ultra-low velocity valves for shock absorbers

Air-oil-separate system (AOS) for the front forks of motocross motorcycles

This business primarily develops and supplies a wide variety of products for automobiles and motorcycles. Leveraging vibration control technology, it serves market requirements for comfort, safety and maneuverability in day-to-day driving and motorsports.

Major Products

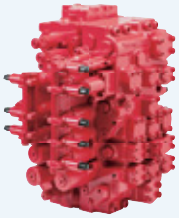
Shock absorbers for automobiles: Shock absorbers (original equipment (OE), aftermarket)

Shock absorbers for motorcycles: Front forks, rear cushion units

Hydraulic equipment for automobiles: Vane pumps, vane pumps for continuously variable transmissions (CVT), hydraulic power steering systems, electric power steering (EPS)

Others: Stay dampers, shock absorbers for all-terrain vehicles, free locks

Hydraulic Components Operations



Control valves

Active suspension systems for railroad cars

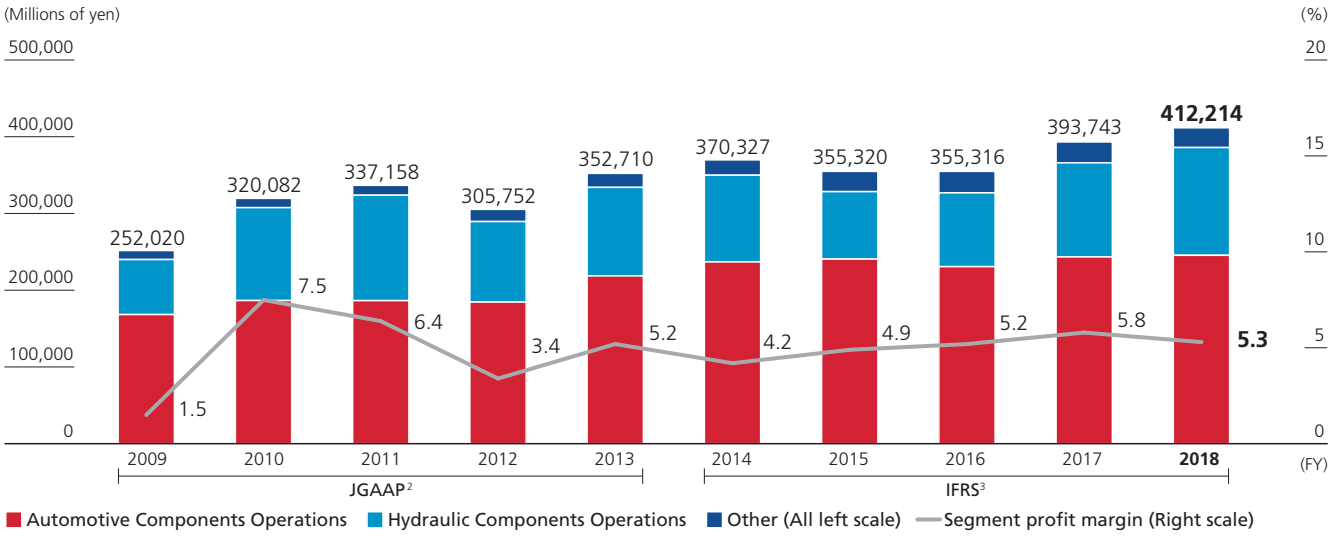
This business develops and supplies a variety of hydraulic equipment for construction machinery, industrial vehicles and railroad cars. It also leverages vibration control technology to meet the needs of onsite *monozukuri* and railroad infrastructure for precision miniaturization, digitalization and systemization.

Major Products

Hydraulic equipment for industrial use: Cylinders, valves, pumps, motors, mini-motion packages (MMP), hydrostatic transmissions (HST)

Others: Dampers for railroad cars, brakes for railroad cars, active suspension systems for railroad cars, seals

Net Sales by Business Segment and Segment Profit Margin[1]



Notes: 1. Before FY2014 segment profit margin was presented as operating profit margin under JGAAP.
2. Japanese Generally Accepted Accounting Principles
3. International Financial Reporting Standards

Other

Concrete mixer trucks

Actuators for aircraft

Chair ski shock absorbers for disabled skiing

Floor equipment

• Special-Purpose Vehicles Division

This business develops and manufactures special-purpose vehicles, focusing on a lineup of small to large concrete mixer trucks that have the largest market share in Japan. The excellent mixing, discharging, environmental performance and other features of our products boost work efficiency.

• Aircraft Components Division

This business supplies flight control systems, landing systems, hydraulic and pneumatic systems and other hydraulic equipment for aircraft. In the aerospace technology market, which requires outstanding reliability, we leverage cutting-edge hydraulic technology to support flight safety and comfort.

• System Products and Electronics Components Business

We are opening up new possibilities for hydraulic technology, such as auditorium and stage control systems that support theater performances. In addition to hydraulic technology, we are also focusing on electronic control technology to develop products such as electronic control units (ECU) for automobiles and other uses.

Major Products

Special-purpose vehicles: Concrete mixer trucks, granular material carriers, special-function vehicles

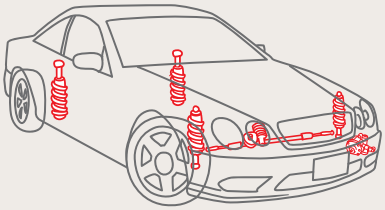
Hydraulic equipment for aircraft: Actuators, valves, wheels, brakes

System products and electronics components, etc.: Auditorium and stage control systems, ECU, mobile communication devices

Product Lineup

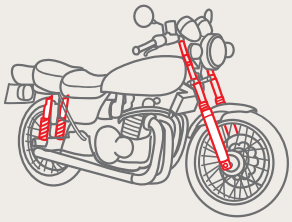
KYB products support *monozukuri* (Japanese manufacturing expertise) in a broad range of fields. The products presented here support daily life by providing safety and comfort in a variety of situations.

Automotive



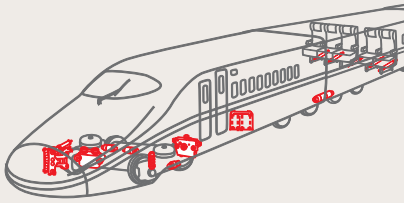
KYB makes automotive components that give users the drivability they want in any situation, from a family outing to a challenging motorsports event.

Motorcycles



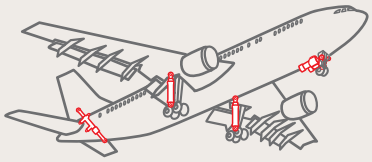
KYB makes motorcycle components for the highest level of riding stability and superior maneuverability by using race-proven technology designed for extreme speed and safety.

Railroad Equipment



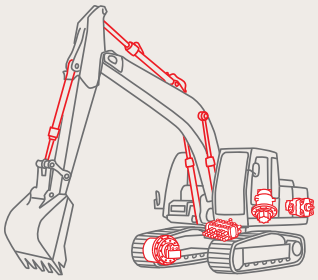
KYB railroad equipment helps achieve comfortable high-speed travel by buffering rolls from air pressure when cornering, passing oncoming trains or entering tunnels.

Aircraft Components



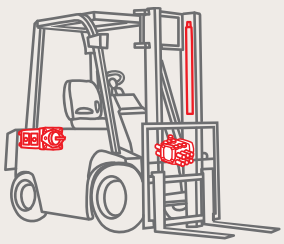
KYB provides a wide range of aircraft components that meet the strict reliability requirements of the aerospace technology market, including components for flight control and landing, and for hydraulic and pneumatic systems.

Construction Machinery



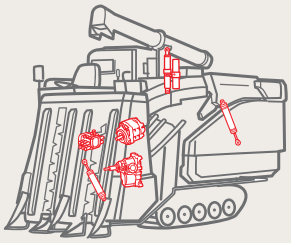
KYB construction machinery components are widely incorporated in equipment used at construction sites under severe conditions.

Industrial Vehicles



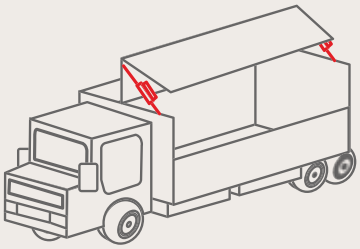
KYB puts its components to work in forklifts and other industrial vehicles to provide powerful support for improved operational efficiency.

Agricultural Machinery



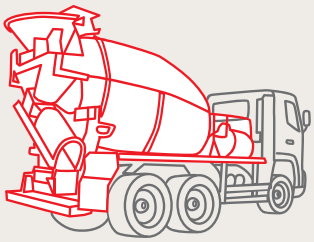
KYB agricultural machinery components save space and energy for easier farming.

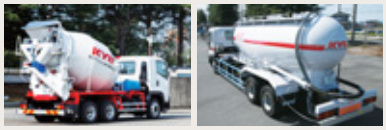
Industrial Machinery



KYB supplies components for industrial machinery from elevators to factory equipment to help accelerate production.

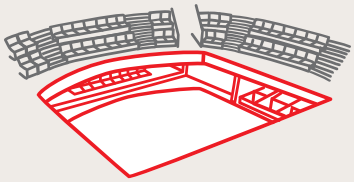
Special-Purpose Vehicles

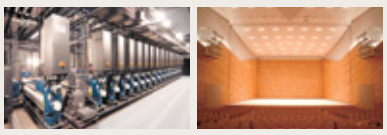




KYB special-purpose vehicles support comfort in all environments. KYB concrete mixer trucks have the highest market share in Japan.

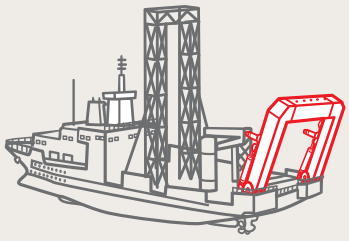
Theater Equipment and Equipment for Theater Construction





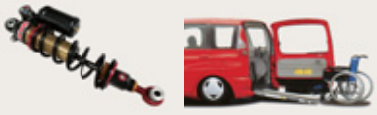
KYB technology supports theatrical productions by providing rigging, acoustic reflectors and other essential equipment for performance venues.

Marine Products



KYB hydraulic and tension control technologies make work at sea easier, including for ships operating remote devices for deep sea exploration, as well as for transport, supply and rescue.

Sports and Welfare



KYB uses its core technologies to develop products for sports and welfare.

Business Strategy Overview

FY2017–2019 Medium-Term Management Plan Progress

	IFRS			
	FY2017 Actual	FY2018 Actual	FY2019 Forecast (As of May 2019)	**FY2019 Target (Announced May 2017)**
Net Sales	¥393.7 billion	¥412.2 billion	¥410.0 billion	**¥398.0 billion**
Segment Profit*	¥22.9 billion	¥22.0 billion	¥20.6 billion	**¥26.0 billion**
(Segment Profit Margin)	5.8%	5.3%	5.0%	**6.5%**
ROE	8.8%	—	8.4%	**10.0%**

*Segment profit corresponds to operating profit in JGAAP.

Basic Strategy for FY2019

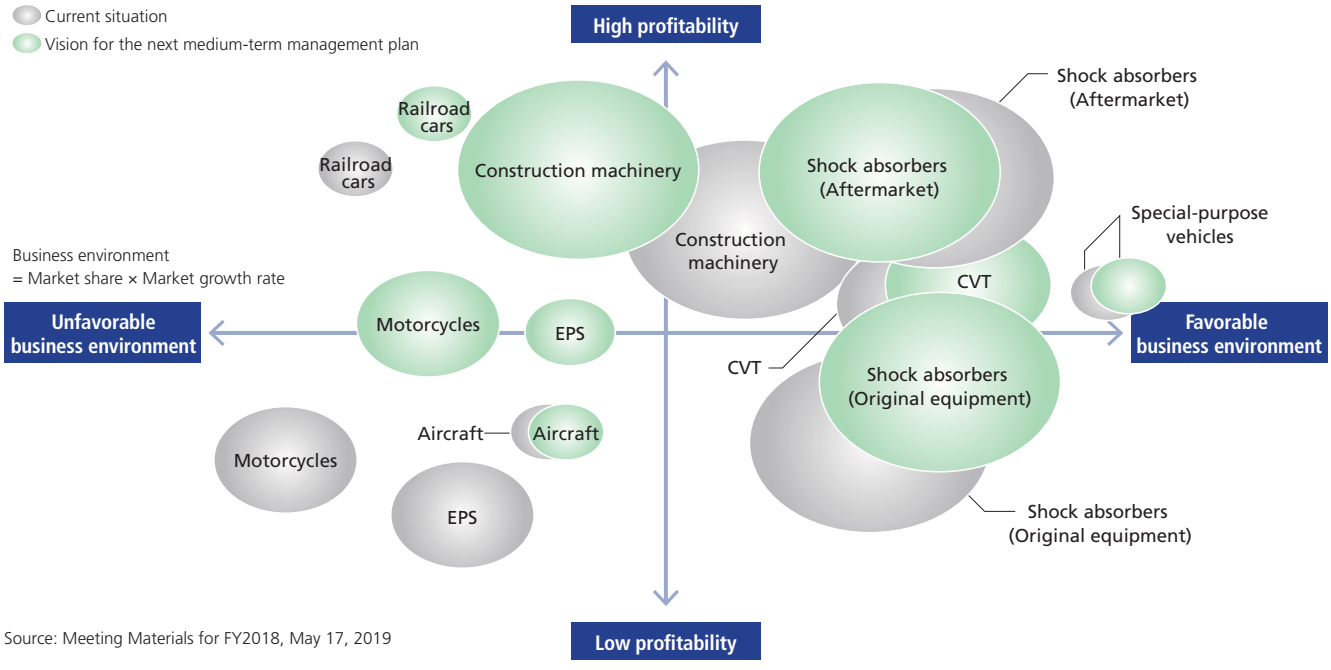
FY2019 is the final year of the FY2017–2019 Medium-Term Management Plan. Positive outcomes during the first two years of the plan include the launch of value-added products for automobiles, and preparations for the transfer and consolidation of the manufacture of products for construction equipment are nearly complete. On the other hand, issues that remain include delays in the restructuring of unprofitable businesses, and delays in production to meet growing demand, especially for hydraulic equipment for construction machinery. In addition, improper acts in the seismic isolation/mitigation oil damper business have caused great concern and inconvenience for all those involved.

Given these circumstances, in FY2019 the Group's top priority is to thoroughly inculcate a corporate culture of compliance and safety first, while focusing on bringing our seismic isolation/mitigation oil dampers into compliance with regulatory standards. In addition, we will move ahead with reorganization by making decisions about pending matters including withdrawing from unprofitable businesses and closing production bases, and will develop competitive new products and promote innovative *monozukuri*.

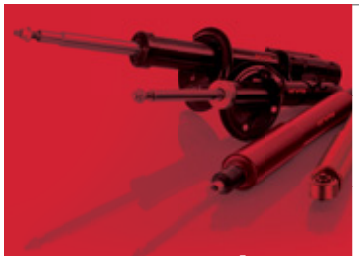
Reforms will be challenging, but seeing them through will strengthen our earnings structure.

Vision for the Next Medium-Term Management Plan

In the next medium-term management plan, we will focus on stabilizing our revenue base and generating sustained growth. Key initiatives to maximize earnings will be closing unprofitable production bases and implementing global restructuring in order to selectively focus on further improving the profitability of businesses in which we are highly competitive.



Source: Meeting Materials for FY2018, May 17, 2019



Automotive Components Operations

Medium-Term Strategy

For long-term growth, map out plan for integrating and reorganizing production bases and companies to match geographical shifts in customer demand, and for developing and promoting sales of value-added products

Progress and Future Initiatives

Fundamental structural reforms are progressing, with geographic and business integration including the reorganization of our operations in Europe and the consolidation of production bases in the motorcycle business. We also expect China to be a growing market for the EPS business and have launched a joint venture there to improve profitability.

We will stabilize our revenue base by globally unifying shock absorber specifications for mass markets, and are planning to start doing the same for aftermarket products to expand sales. In addition, we will use IoT and AI to accelerate the launch of innovative product lines in Japan and overseas, gradually increasing the level of automation with the ultimate goal of eliminating processing costs though fully automated operations.

We will also work to generate sustained growth through further rollouts of the high-value-added products we are already mass-producing to increase orders, and by expanding product orders and promoting sales of products for the growing sport utility vehicle, electric vehicle and pickup truck markets.

Hydraulic Components Operations

Medium-Term Strategy

Ensure stable sales and profit that are unaffected by market fluctuations
Maintain base in excavators while promoting sales in growth markets in which we were not fully active

Progress and Future Initiatives

Building a system that is resilient to market fluctuations is a key initiative for the Hydraulic Components segment, which has therefore been transferring production of control valves for medium-sized excavators to create an integrated line. Integrating casting, machining and assembly lines will improve productivity, and integrating production and development bases will reduce development time and further improve product capabilities. In addition, we will consolidate the production of motor products to establish a system that can handle high demand.

In the mini and ultra-large excavator markets, where demand is forecast to remain stable, we expect to maintain high market share by expanding production capacity.

In addition, to generate sustained growth, we will conduct sales promotion activities for products for the railroad, agricultural machinery, skid-steer loader (SSL) and compact track loader (CTL) and other non-construction machinery markets.

Other

Progress and Future Initiatives

In the Special-Purpose Vehicle Division, we will leverage our solid domestic market share to strengthen after-sales service and service part sales in Japan while further expanding business overseas.

In the Aircraft Components Division, we will focus on quickly resolving the issue of inappropriate claims in connection with defense equipment and improve profitability by reviewing conventional channels for expanding private sector demand and by streamlining the public sector business.

In the System Products and Electronics Components Business, we will focus on preventing the recurrence of improper acts regarding seismic isolation/mitigation oil dampers and on manufacturing replacement parts.