

JTEKT



Electric **P**ower **S**teering **Systems**

JTEKT

JTEKT CORPORATION

CAT.NO.S1001E

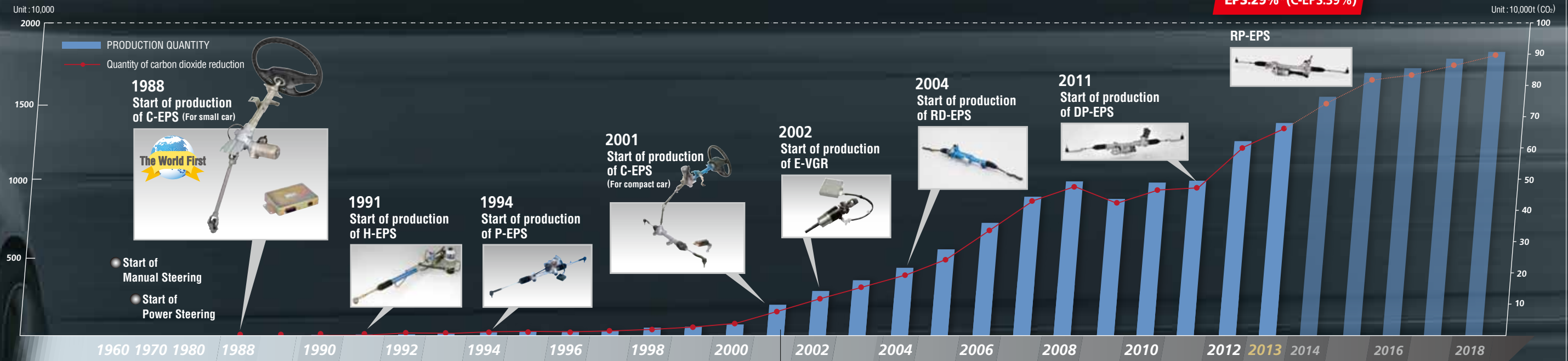


Safety, Comfort & Ecology

Reliability backed by experience, immeasurable sensitivity and technologies, and energy-saving features in tune with the times

Proudly No.1 in the Global Market One in three vehicles is equipped with JTEKT electric power steering (EPS)

Share No.1
EPS:29%*(C-EPS:39%)



EPS start of production overseas

- 1998 Europe
- 2001 North America
- 2007 China / Thailand
- 2009 India
- 2011 Indonesia

Our goal is sensational driving experiences – JTEKT
A Feeling of Unity between Driver and Car,
and Steering Feel That Stimulates the Senses...

"Driving," "Cornering" and "Stopping."

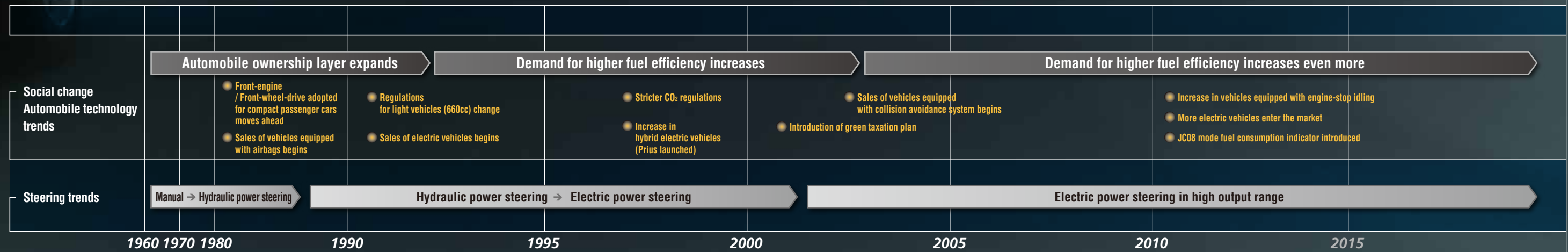
Of the three basic vehicle performance functions, our forte is "Cornering."

Committed to producing superior steering equipment,

JTEKT developed the world's first electric power steering (EPS) system in 1988.

Today, our products hold No. 1 market share around the globe.

Electric Power Steering Systems



Proposal of optimal electric power steering (EPS) system considering safety, comfort and ecology

As the world's No.1 contributor to the environment,* JTEKT a comprehensive steering systems manufacturer committed to providing optimal systems that match vehicle use/purpose by ensuring products are well-balanced in all areas; from quality, cost and delivery to safety, comfort and ecology.

* JTEKT is world No. 1 in contributing to the environment. Our EPS systems have top market share, offer superior fuel efficiency and contribute to environmental conservation to the highest degree. We are also working to improve the environmental efficiency of conventional hydraulic power steering systems.

Reliability backed by experience
SAFETY

Immeasurable sensitivity and technologies
COMFORT

Energy-saving upon request with the times
ECOLOGY

JTEKT responds to market demand in support of a vehicle society of tomorrow as a steering system supplier.

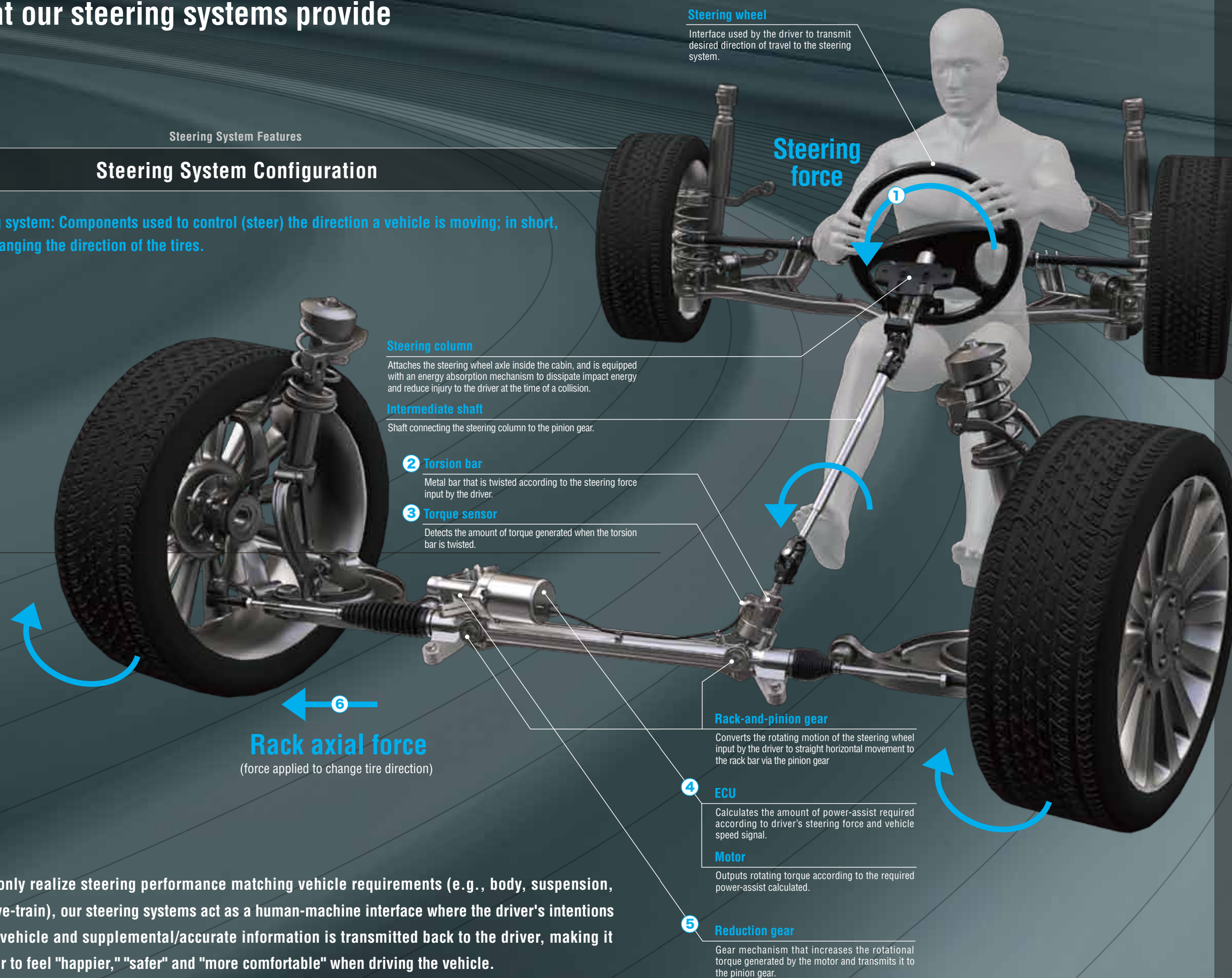
A Confident, Relaxing Driving Experience... That's what our steering systems provide

Steering System Features

Steering System Configuration

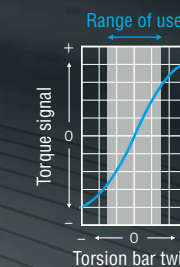
Definition of steering system: Components used to control (steer) the direction a vehicle is moving; in short, the equipment for changing the direction of the tires.

JTEKT products not only realize steering performance matching vehicle requirements (e.g., body, suspension, tires, brakes and drive-train), our steering systems act as a human-machine interface where the driver's intentions are delivered to the vehicle and supplemental/accurate information is transmitted back to the driver, making it possible for the driver to feel "happier," "safer" and "more comfortable" when driving the vehicle.

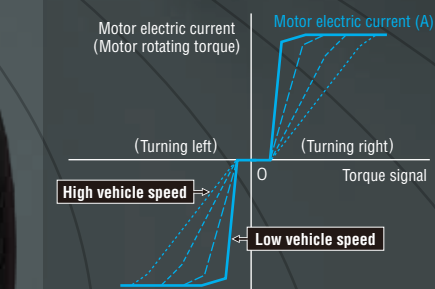


Basic steering operation

- 1 Steering wheel is turned.
- 2 The force input to the steering wheel (torque) twists the torsion bar.
- 3 Torsion bar twisting is detected as a torque signal by the torque sensor and input into the ECU.

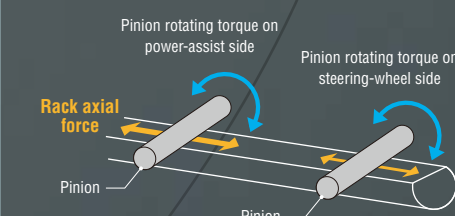


- 4 ECU adds electric current to the motor based on torque signal and vehicle speed.



- 5 Motor rotating torque is increased by the reduction gear and transmitted to the pinion.

- 6 Pinion rotating torque (supplemental steering torque) on the power-assist side and pinion rotating torque (steering rotating torque) on the steering-wheel side are converted to rack axial force to change tire direction.



JTEKT Steering Systems

Standard System Proposal

Rack force (kN)		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																																																								
Vehicle segment		UA/A		B		C		D		E		F		SUV/P-UP																																																																												
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Steering system		<table border="1"> <tr> <td rowspan="2">Column-assist</td> <td rowspan="2">C-EPS</td> <td colspan="10">Application range</td> <td colspan="7">★ : Recommended</td> </tr> <tr> <td colspan="10">Application range</td> <td colspan="7">★ : Recommended</td> </tr> <tr> <td rowspan="2">Rack-assist</td> <td rowspan="2">P-EPS DP-EPS RP-EPS RD-EPS H-EPS</td> <td colspan="8">Application range</td> <td colspan="9">★ : Recommended</td> </tr> <tr> <td colspan="8">Application range</td> <td colspan="9">★ : Recommended</td> </tr> </table>																	Column-assist	C-EPS	Application range										★ : Recommended							Application range										★ : Recommended							Rack-assist	P-EPS DP-EPS RP-EPS RD-EPS H-EPS	Application range								★ : Recommended									Application range								★ : Recommended								
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JTEKT EPS systems are compatible for most automobiles, from small vehicles to large SUVs

System Features by Type

Column-assist

Since the motor and ECU are inside the cabin, waterproofing is not required and there is no influence on engine and transmission layout.



Optimum steering system for compact vehicles with small rack force

Rack-assist

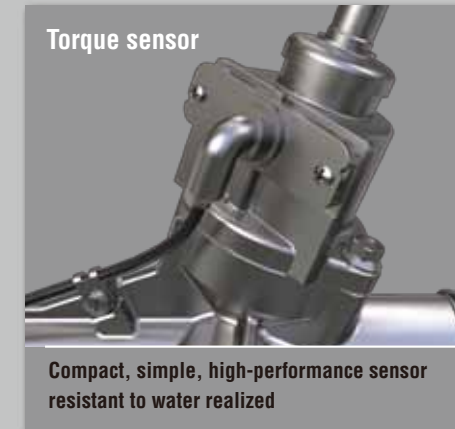
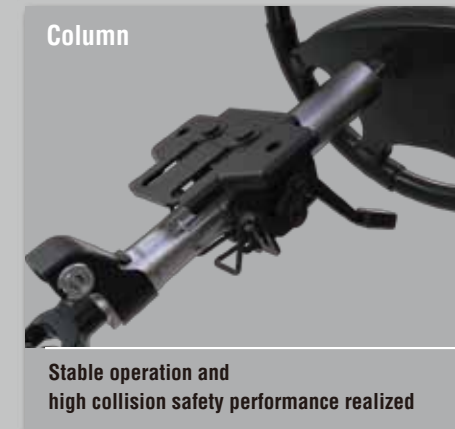
Excellent steering performance as the result of minimal friction between the time of turning the steering wheel and start of rack movement.



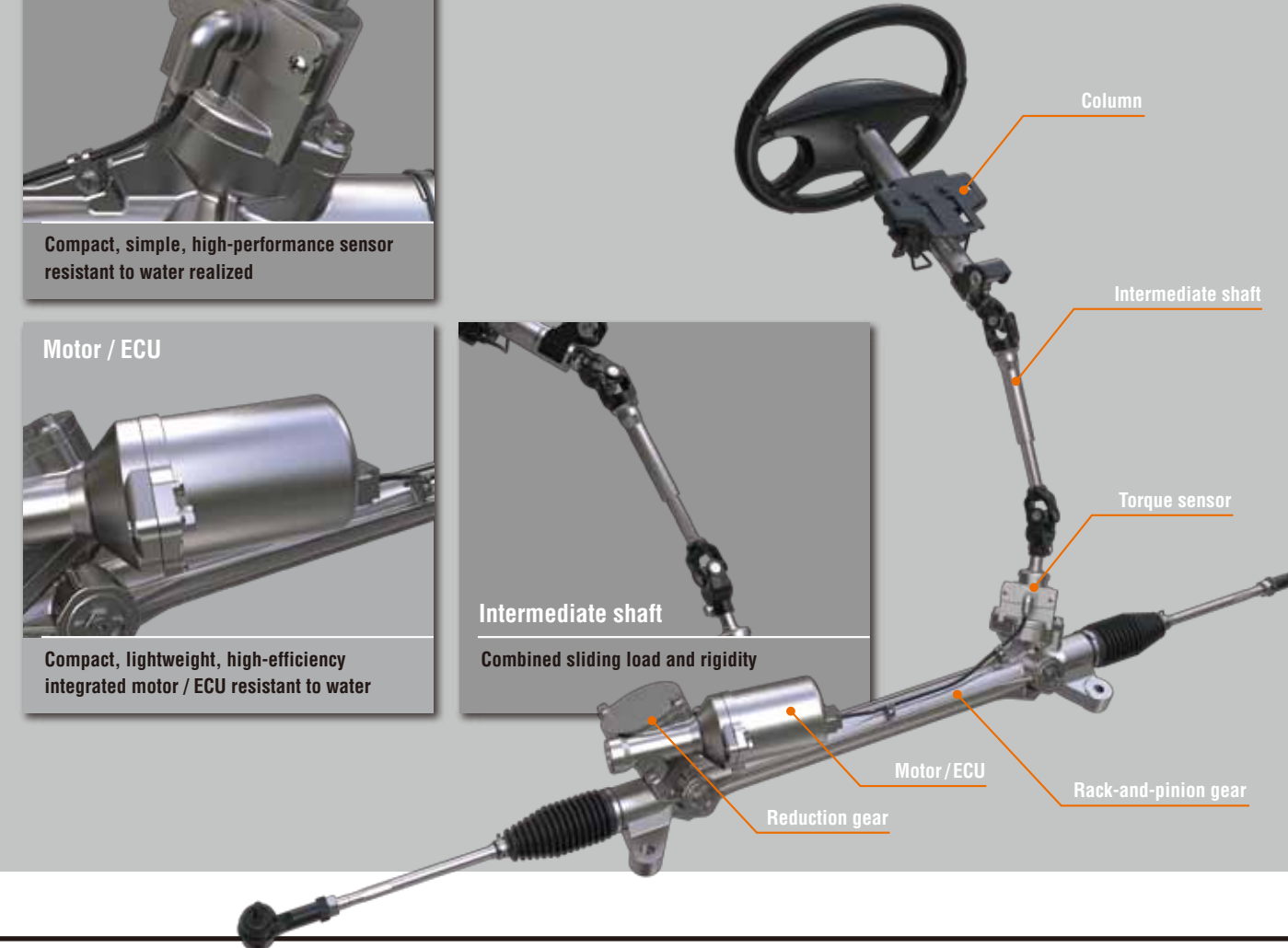
Optimum steering system for medium- to large-sized vehicles that require better steering performance

DP-EPS

- Rack-assist realizes excellent steering feel with high rigidity and superior dynamic performance.
- System structure with flexible mounting freedom realized by separating the assist unit from the steering wheel axle.
- Enhanced degree of freedom in specific stroke on the steering-wheel side realized by adopting an optimal design to reinforce the assist unit.
- System with excellent safety, comfort and environmental performance realized through the application of proven technologies.

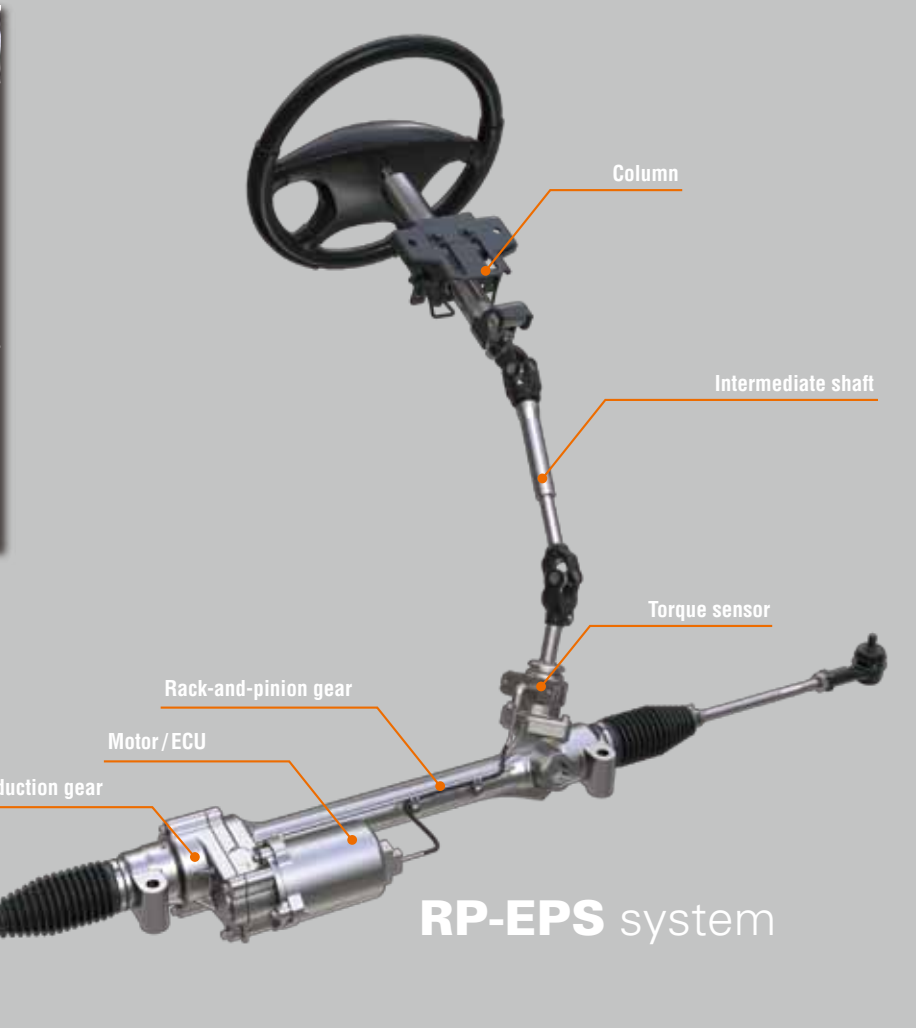
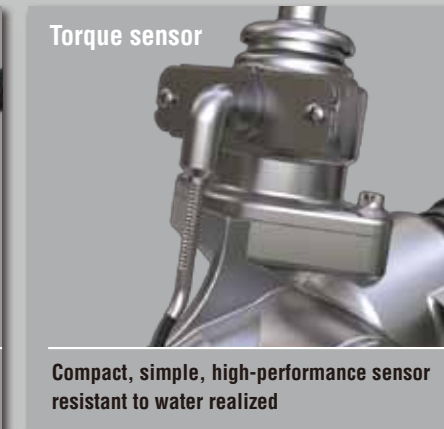
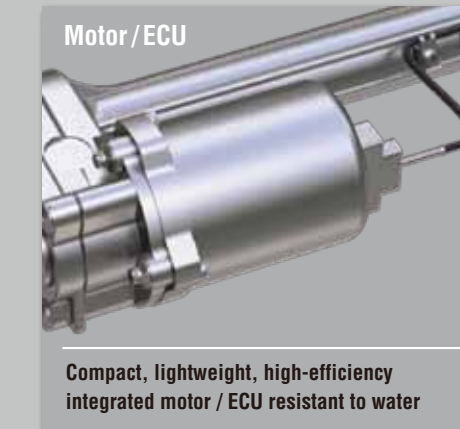


DP-EPS system



RP-EPS

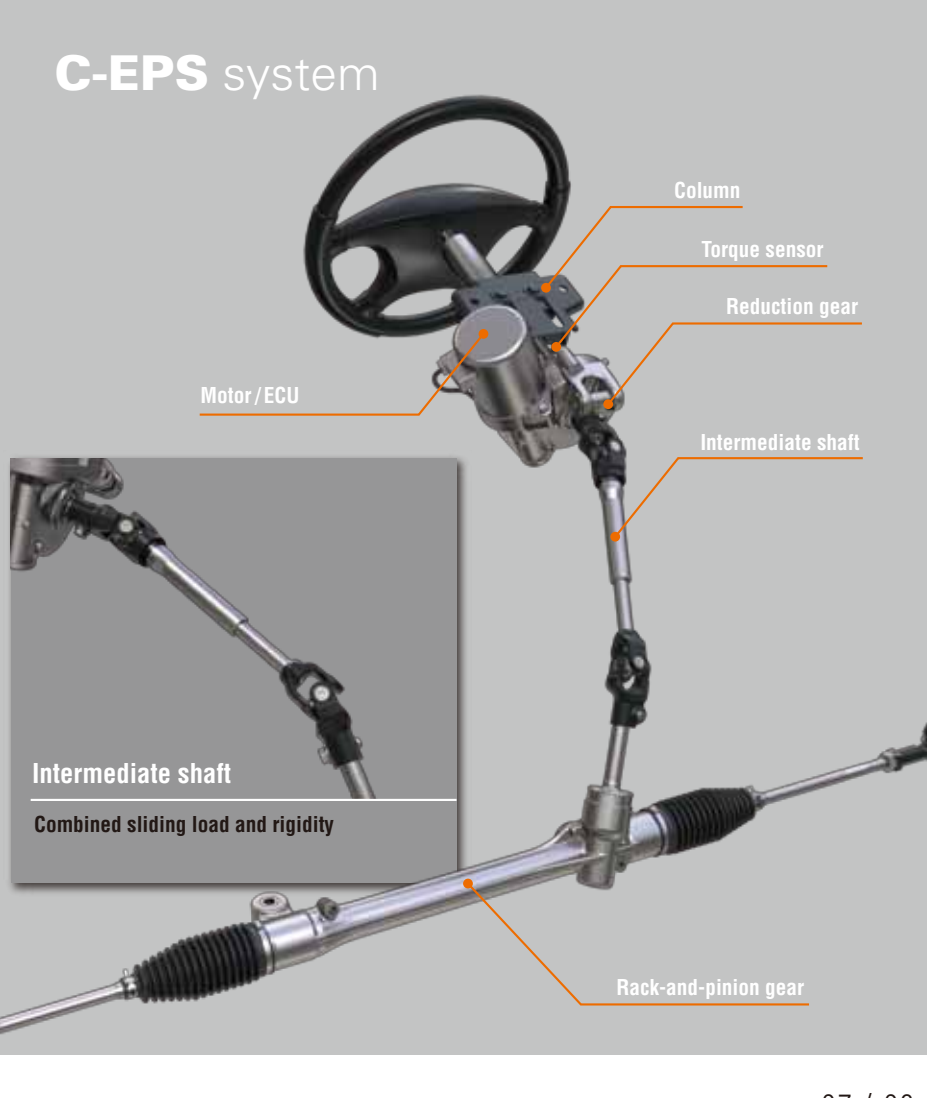
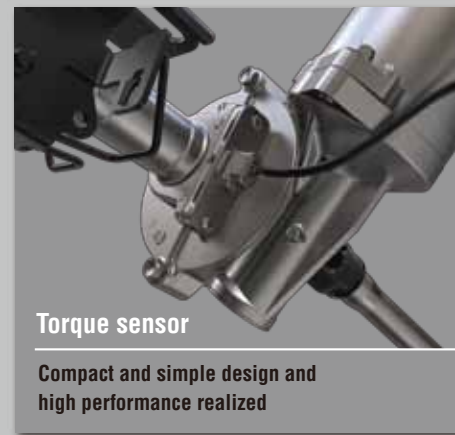
- Rack-assist realizes excellent steering feel with high rigidity and superior dynamic performance.
- Easier installation realized with adoption of high-output, compact reduction gear.
- System with excellent safety, comfort and environmental performance realized through the application of proven technologies.



RP-EPS system

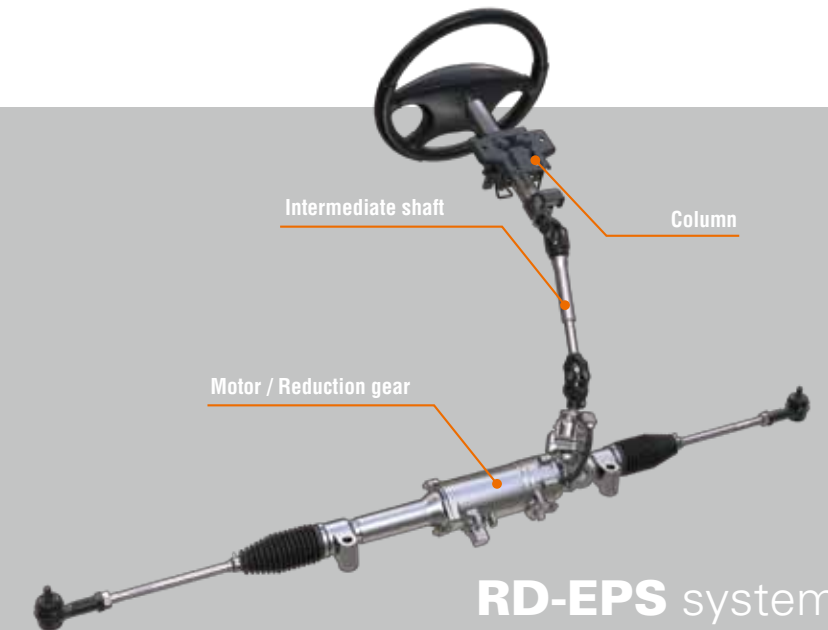
C-EPS

- Ideal for compact vehicles with small engine compartment: power-assist unit is located in the steering column
- Introduced as the world's first EPS in 1988
- Superior safety, comfort and environmental performance based on technologies and experience accumulated since its introduction



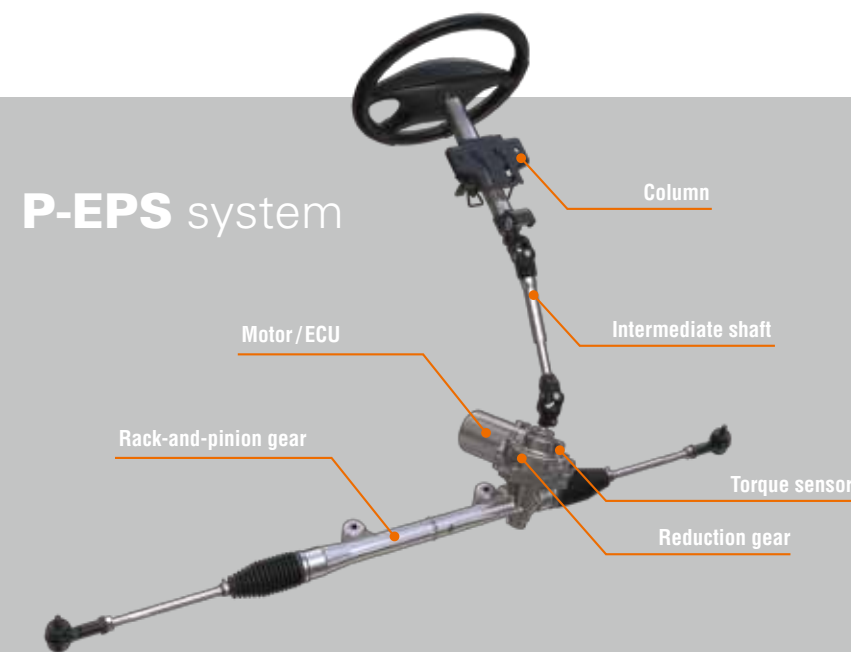
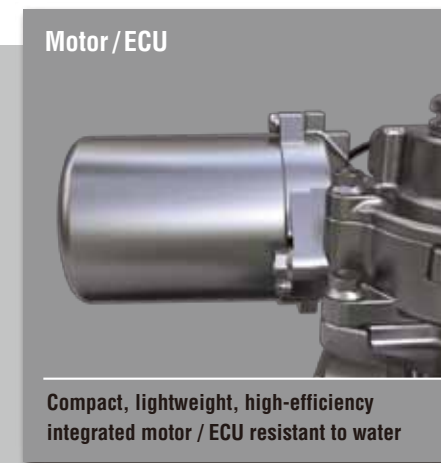
RD-EPS

- Rack-assist realizes superior direct-response steering feel.
- Superior energy-saving system has less reduction gear loss and high machine efficiency.
- System with excellent safety, comfort and environmental performance realized through the application of proven technologies.



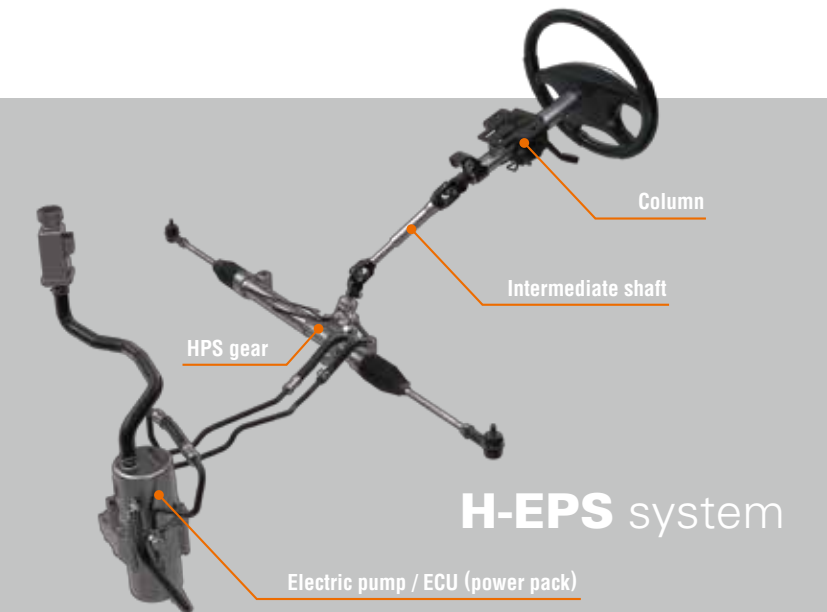
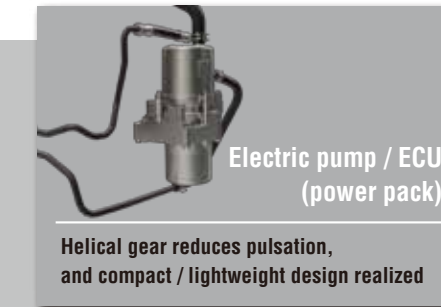
P-EPS

- Rack-assist realizes excellent steering feel with high rigidity and superior dynamic performance.
- Small/compact system adopted in response the engine room environment.
- System with excellent safety, comfort and environmental performance realized through the application of proven technologies.



H-EPS

- Excellent safety, comfort and environmental performance realized using an energy-saving hydraulic power steering system equipped with an electric pump.
- Extremely flexible installation and ability to use for EV driving realized by adopting an independent electric pump.
- Excellent steering feel and improved fuel efficiency realized through optimum discharge setting (MAP) and special valve tuning.

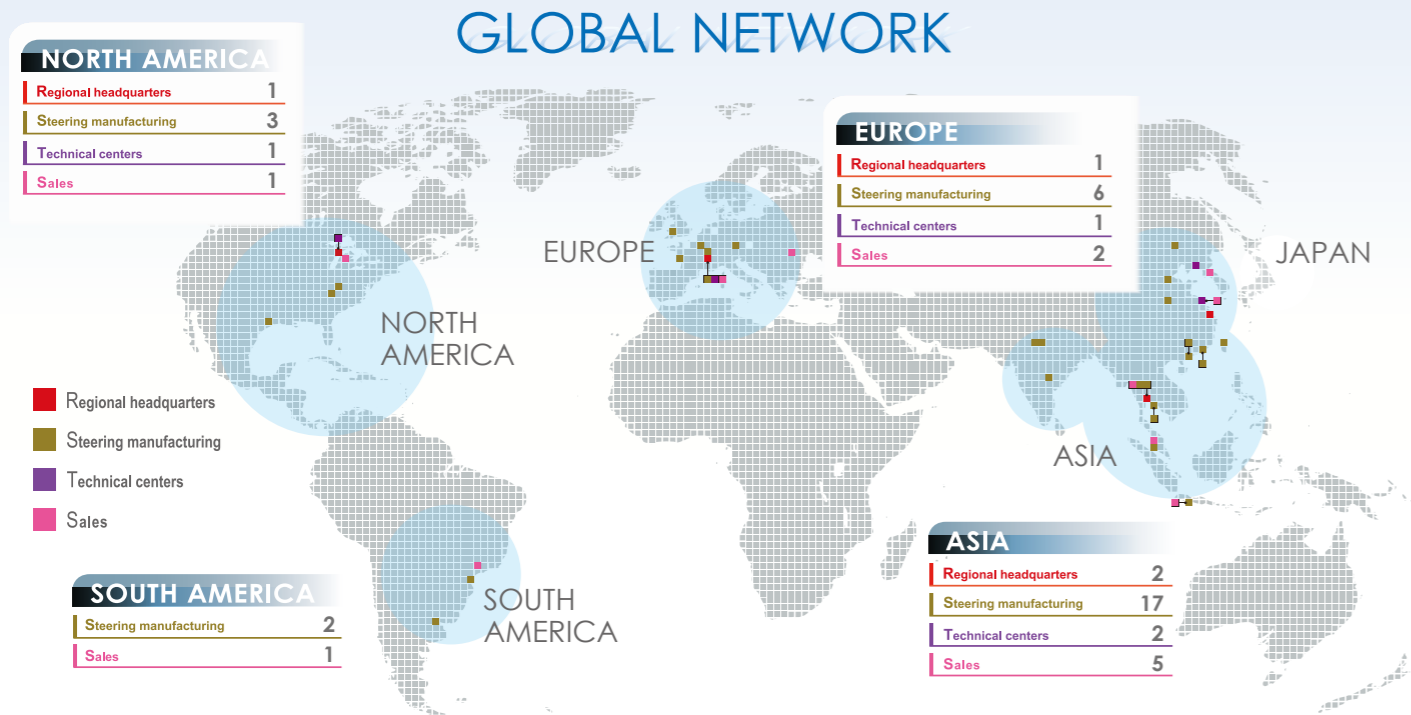


E-VGR

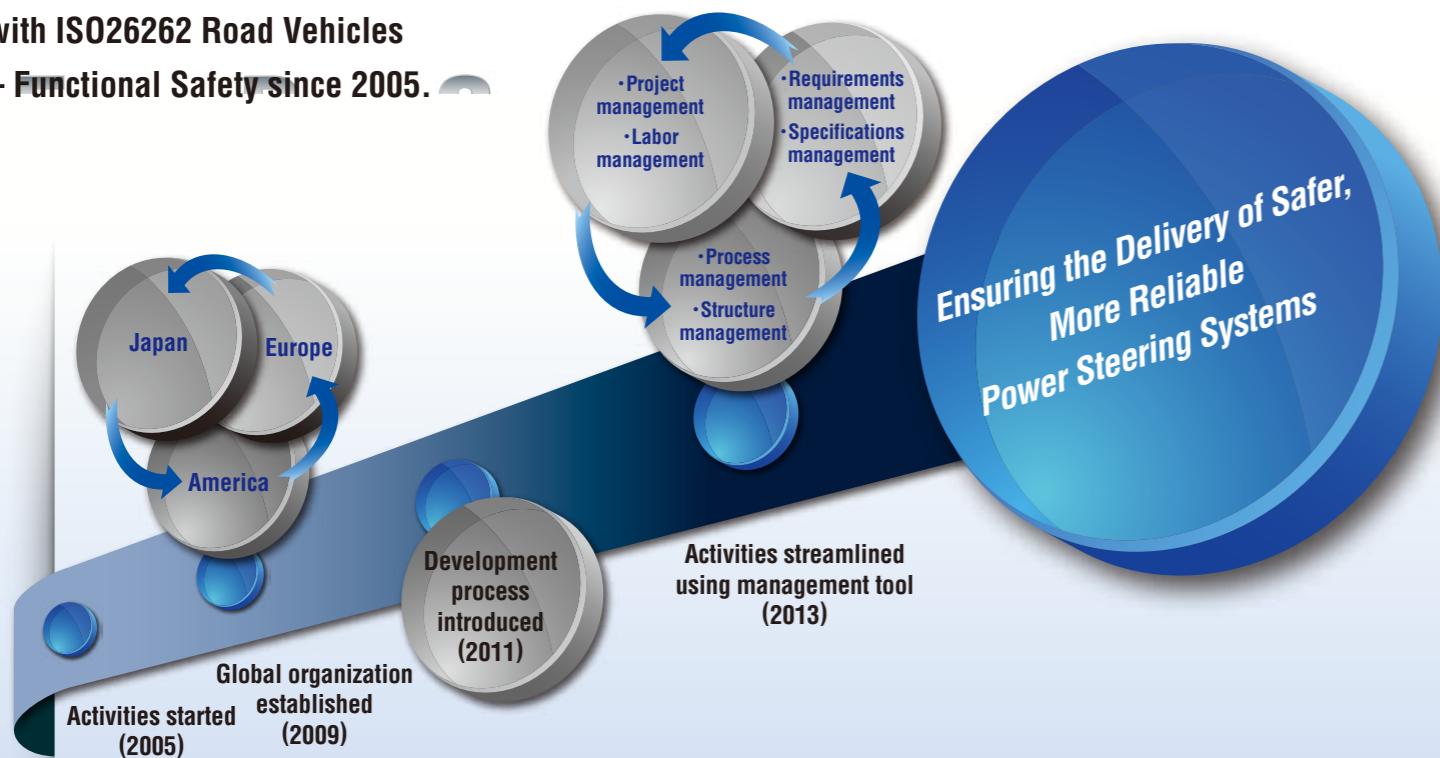
- Variable steering-angle ratio system combining vehicle stability and steering performance.
- Steering performance improved by increasing steering angle ratio at low speed.
- Straight-line driving stability improved by decreasing steering-angle ratio at high speed.
- Vehicle stability improved by activating low-friction moment, etc.



Safer, More Reliable Power Steering Systems to Customers Worldwide



JTEKT has been conducting activities to ensure compliance with functional safety standards in accordance with ISO26262 Road Vehicles – Functional Safety since 2005.

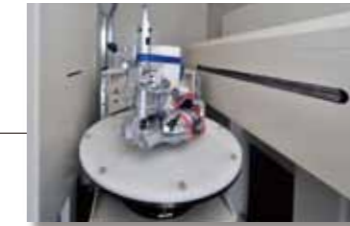


Advanced Research & Development Facilities for Producing Next-generation EPS Systems

JTEKT R&D centers exchange information around the world, enabling the company to accurately understand market demand and provide the newest/best/optimal systems to meet the diversified needs of our customers.



Electromagnetic Anechoic Chamber



X-Ray CT Scanner



Driving simulator



Vehicle evaluation in cold regions



Design backed by analytical data



Steering Column Impact Testing Apparatus



Power Steering System Energy Consumption Measuring Apparatus

Iga Proving Ground Enables Testing / Evaluations Simulating Roads Worldwide

Fully utilizing our knowledge as a world-leading systems supplier, JTEKT conducts driving evaluations and analyses of products installed in vehicles. We exhaustively pursue the highest standards in product safety and operation on a test course capable of simulating various road and weather conditions around the world. As a total systems supplier, our highest value is to provide our customers with products that deliver outstanding performance and the best quality that help to make automobiles that are more than just fun to drive.





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