

# Constant-Velocity Joints

Constant-velocity joints (CVJs) are parts that transmit the power of an automobile engine's rotation smoothly, efficiently and constantly to the vehicle's tires. CVJs enhance the compactness, lightness and high-efficiency characteristics of a vehicle, thereby contributing to the achievement of low fuel consumption and reduced CO<sub>2</sub> emissions, both of which are issues in the automobile industry.



## Review of Operations

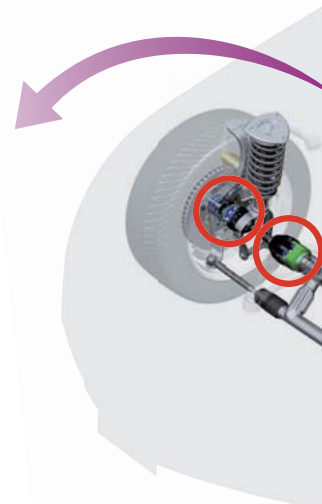
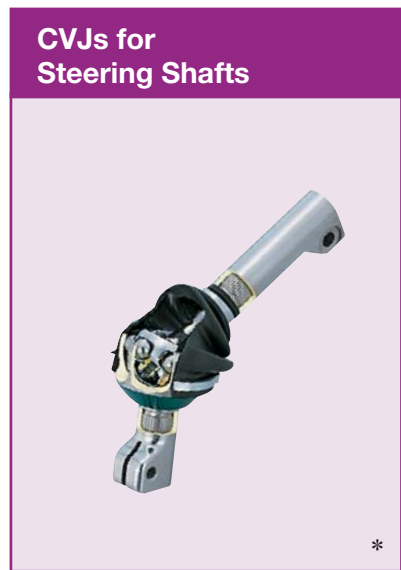
During the fiscal year under review, the NTN Group's net sales of CVJs declined ¥8.8 billion, or 7.1%, to ¥115.7 billion.

In Japan, sales declined by ¥7.5 billion, or 15.6%, year on year to ¥40.7 billion, mainly due to declines in overall demand by automakers and the export business.

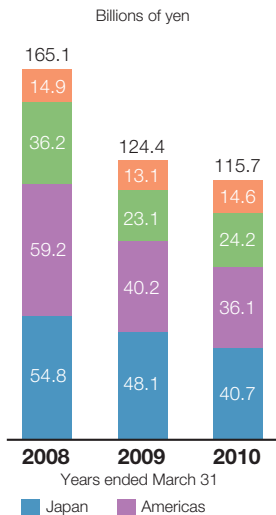
In the Americas, sales fell mainly due to reduced production by automakers and unfavorable foreign exchange rates, despite recovery in demand by U.S. automakers in the second half of the fiscal year under review and the start of volume production of new products. As a result, net sales in the region decreased ¥4.1 billion, or 10.2%, from a year earlier to ¥36.1 billion. In the U.S., we are increasing our production capabilities in response to the recovery of automobile demand.

In Europe, net sales rose ¥1.2 billion, or 5.2%, year on year to ¥24.2 billion, due to the contribution of the start of volume production of new products as well as favorable sales for small vehicle applications in the second half of the fiscal year under review. In October 2009, production started at SNR's plant in Romania.

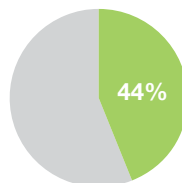
In China and other areas of the Asian region, demand in China increased throughout the year and also demand in other areas of the Asian region increased in the second half of the fiscal year under review. As a result, net sales increased ¥1.6 billion, or 12.2%, from a year earlier to ¥14.6 billion.



**Constant-Velocity Joint Sales**

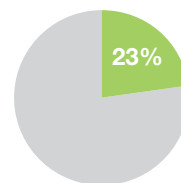


**NTN's Share of Japanese Market**  
(No. 1 in Japan)



Year ended March 31, 2010

**NTN's Share of Global Market**  
(No. 2 in the world)



Year ended March 31, 2010

(NTN's estimates)

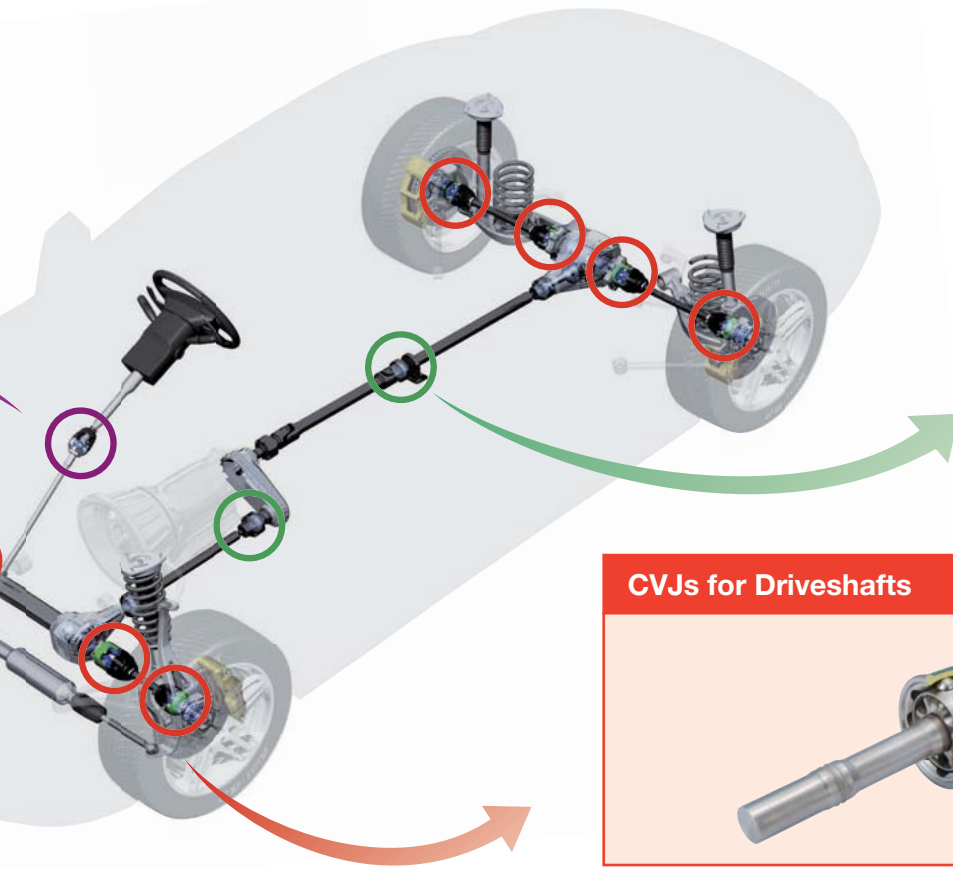
In 1963, NTN was the first company in Japan to start production of fixed-type constant-velocity joints. After that, we added other plunging CVJs to our product lineup. We also attached both fixed and plunging CVJs to a driveshaft and started supplying these products to automotive manufacturers.

Spurred by the oil shock in 1973, sales of front-wheel-drive vehicles began to increase as automakers adopted full-fledged initiatives to achieve fuel efficiency. At the same time, production of CVJs leaped. Furthermore, the business field of built-in CVJs is expanding because automotive manufacturers are using CVJs in drive shafts for rear-wheel-drive and in propeller shafts for four-wheel-drive vehicles, to improve the ride characteristics.

Amid this expanding demand for CVJs, NTN has been actively increasing its production bases worldwide since the 1990s, and is now engaged in business at 18 manufacturing bases, including in Brazil.

In recent years, automakers have been tackling the major development themes of reducing environmental impact and contributing to greater automobile design freedom, in order to develop more advanced vehicles. In this context, CVJs also are strongly required to achieve greater lightness and compactness, and to reduce noise, vibration, and harshness (NVH). Because the function and quality of CVJs improve on the performance of automobiles, we are required to stay at the forefront of trends in automobile technology and carry out a variety of specific improvements.

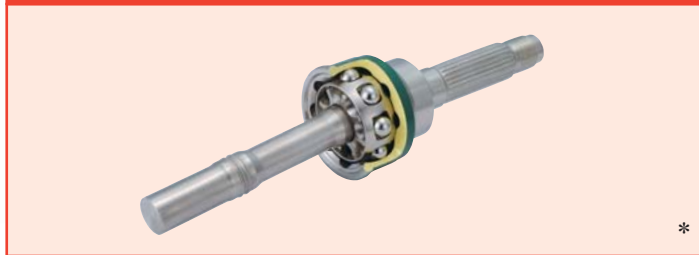
To meet these needs, we work to fully exhibit the technological capabilities that we have built up over many years, and are moving ahead with the development of new products and technologies.



### CVJs for Propeller Shafts



### CVJs for Driveshafts



## New Products

### “Lightweight, compact fixed-type CVJ” exclusively for propeller shafts

NTN has developed a “lightweight, compact fixed-type constant velocity joint” for the propeller shafts of rear-wheel-drive (FR) and four-wheel-drive (4WD) vehicles. Hitherto, CVJs with the design for the drive shaft changed to a design for the propeller shaft have been used for the fixed-type CVJs for the propeller shafts of FR and 4WD vehicles. However, recently a reduction in weight and an increase in compactness have been required for propeller shafts to improve fuel economy. As a result, all parts of the “lightweight, compact fixed-type CVJ” have been exclusively designed for propeller shafts, achieving smallness and compactness while maintaining the strength and durability of the CVJ.



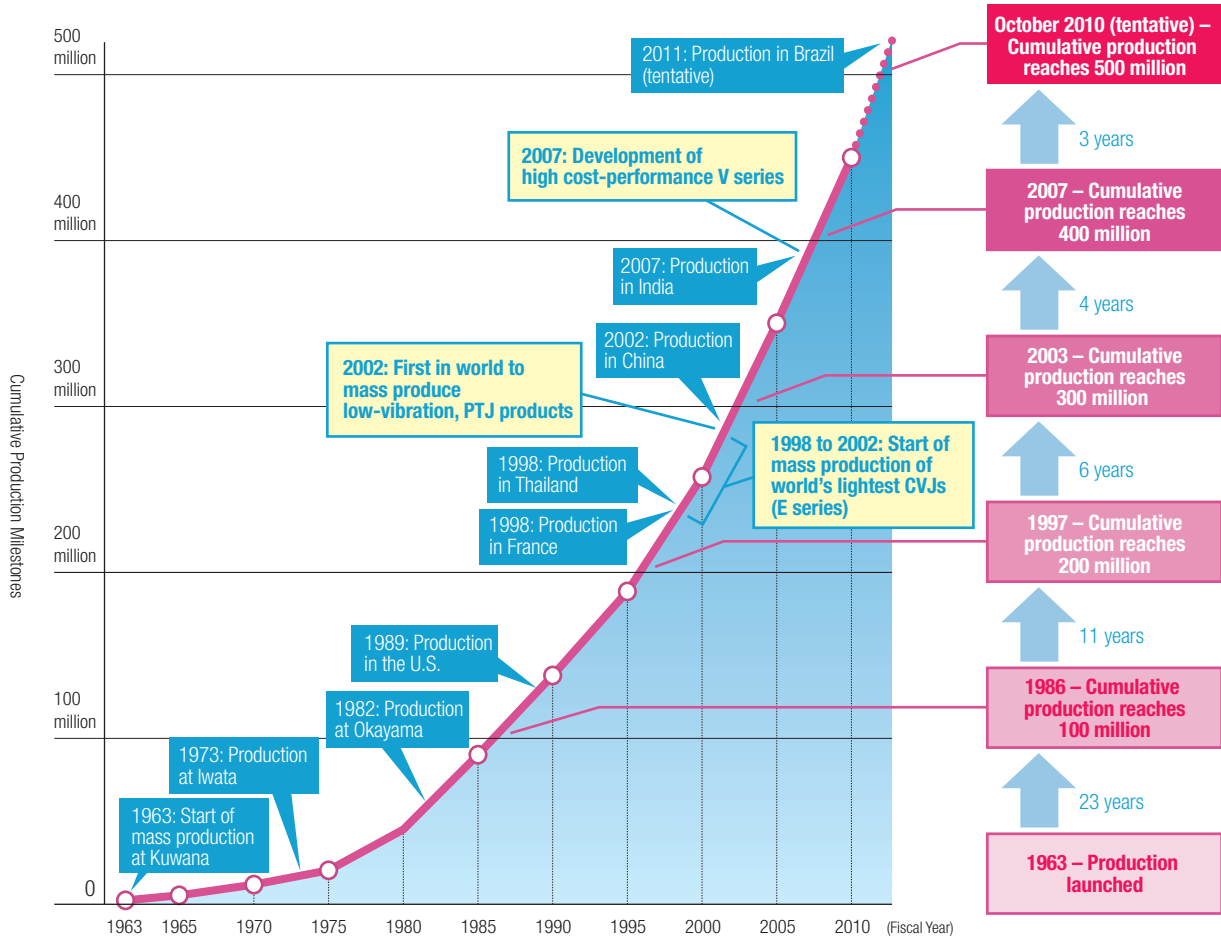
### “Light and high-efficiency drive shaft” exclusively for rear-wheel-drive cars

NTN has developed a “light and high-efficiency drive shaft optimally designed for rear-wheel-drive cars”, which is the type of drive used in luxury cars. In recent years, there have been needs for lightness and high-efficiency in the drive parts for luxury cars with the aim of achieving low fuel consumption. Furthermore, to achieve smooth ride characteristics, there is a need to reduce the backlash in the rotational direction of the drive shaft. With this newly developed product, NTN has been able to make it lighter and more efficient (decreased torque loss) and reduce the backlash in the rotational direction by using a drive shaft composed of two pieces of newly developed slide type, cross-grooved, CVJs and a hollow shaft inter-connecting the two CVJs.



\*Photos are cross-sectional models of products.

### Accumulated Number of CVJs Manufactured



## TOPICS

### Establishment of production base for CVJs in Brazil

In June 2010, NTN established NTN de Brasil Producao de Semi-Eixos Ltda., a new company to manufacture and sell CVJs in Brazil. Amid the anticipated significant growth in demand for automobiles in Brazil, we have faced the increasing necessity of

implementing local production of CVJs. The establishment of this new company in Brazil will strengthen our manufacturing and sales organization in South America, with a focus on Brazil, and boost our competitiveness globally. This new location in Brazil will be NTN's 18th CVJ production base.

### Accumulated Number of CVJs Manufactured

