



Special Feature

01 Creating a next-generation smart society

Contributing to Autonomous Driving Evolution Through Materials

Using smart technologies to resolve social issues

Right now, people all around the world are researching and developing autonomous driving technologies. The majority of development is focused on using GPS and camera image recognition technologies, but those alone are unable to cover all driving scenarios. For example, GPS does not reach some hilly and mountainous areas or in tunnels. In areas of heavy snowfall as well, there is a risk that the road dividing lines will be covered by snow and the camera image recognition reliability will drop. In many of these areas as well, communities are facing the urgent challenge of securing local transportation options because of reduced or canceled rail and bus services due to labor shortages and financial difficulties resulting from aging and declining populations.

Since 2017, we have been collaborating with national and local governments, and East Japan Railway Company, to trial an autonomous driving system in various regions. This magnetic marker system, developed independently by Aichi Steel, is able to support GPS and camera image recognition technologies.

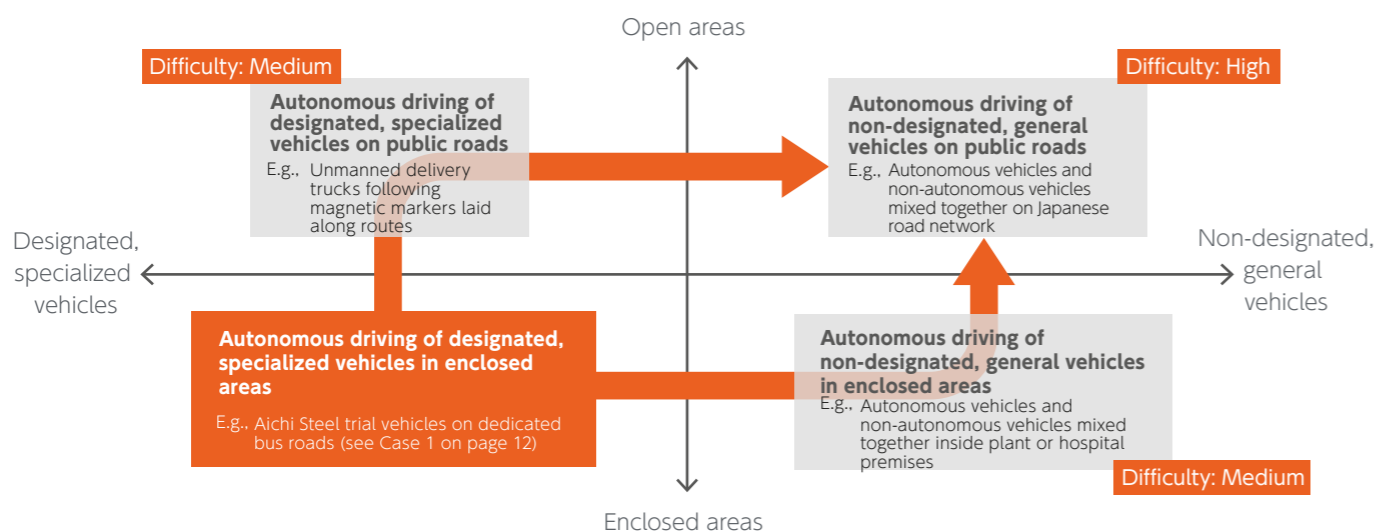
TOPICS

Frontier Research and Development Div.

In preparation for the arrival of a smart society, this division was established in 2018 for the purpose of creating new businesses. The division is driving research and development in a total of six fields—Smart Transportation Systems, Batteries, Electronic components, Motors and Magnets, Advanced materials, and Environment and energy.

Autonomous driving business areas for Aichi Steel

To quickly respond to urgent social challenges, we are conducting autonomous driving trials of designated, specialized vehicles in enclosed areas, which we expect can be achieved in the near-term. In the future, we will look into the potential of these technologies in open areas and non-designated, general vehicles as part of efforts to achieve autonomous driving of non-designated, general vehicles on public roads.



CASE 1 Joint seven-company project with East Japan Railway Company and others

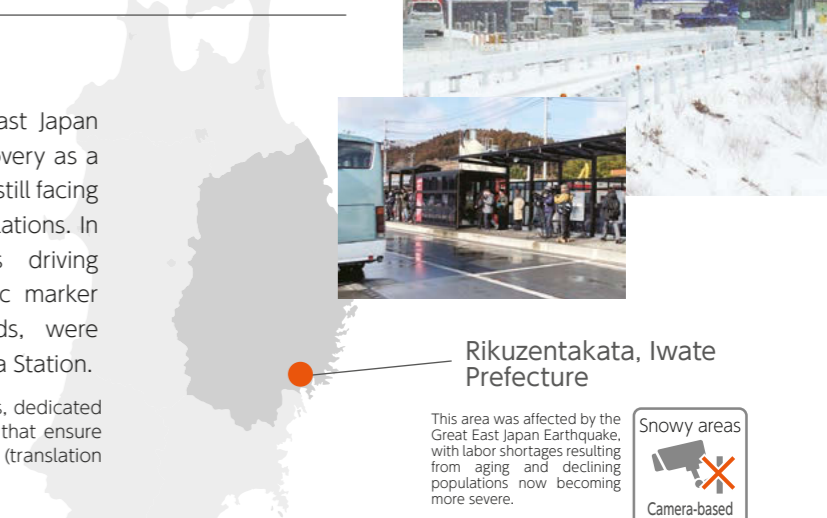
Autonomous Bus Trials on JR Ofunato Line BRT*

Period: December 2018 to March 2019
Area: Vicinity of Takekoma Station on JR Ofunato Line BRT

Having sustained considerable damage in the Great East Japan Earthquake, the JR Ofunato Line is in the process of recovery as a BRT system*. However, the area serviced by the rail line is still facing labor shortages resulting from aging and declining populations. In hope of addressing this issue with autonomous driving technologies, trials of a BRT system, using a magnetic marker system that functions even on snow-covered roads, were conducted on dedicated roads in the vicinity of Takekoma Station.

* Bus rapid transit system: A bus system, combining articulated buses, dedicated bus roads, bus lanes and other elements, with advanced features that ensure rapid, on-time performance and enable increases in transit capacity. (translation of MLIT definition)

- POINT**
- Model case for restoration support
 - Safe transportation within unique BRT alternating traffic zones (controlled by traffic signals via wireless exchange of bus locations)



Rikuzentakata, Iwate Prefecture

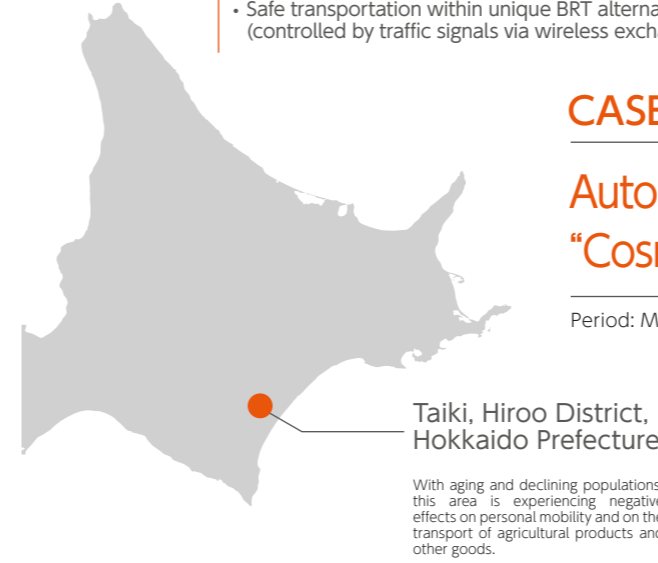
This area was affected by the Great East Japan Earthquake, with labor shortages resulting from aging and declining populations now becoming more severe.



CASE 2 Joint project with MLIT

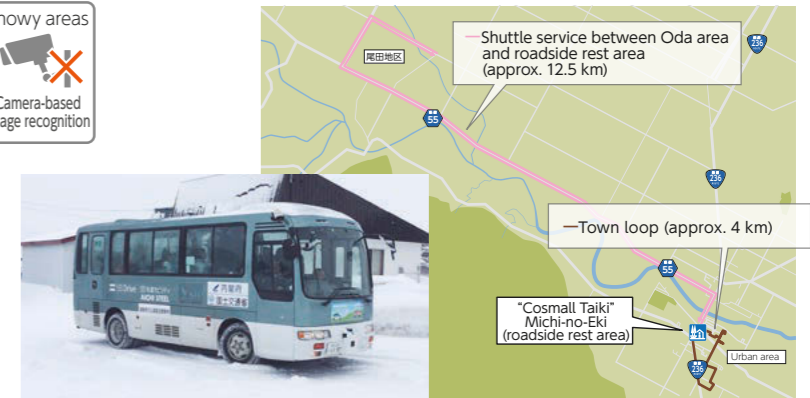
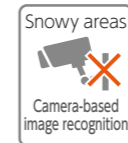
Autonomous Driving Service Trials at the "Cosmall Taiki" Michi-no-Eki (Roadside Rest Area)

Period: May to June 2019
Area: Two routes centered on Cosmall Taiki roadside rest area (Level 2 trial of buses with up to 17 passengers traveling at speeds of up to 40 km/h)



Taiki, Hiroo District, Hokkaido Prefecture

With aging and declining populations, this area is experiencing negative effects on personal mobility and on the transport of agricultural products and other goods.



In the village of Taiki in Hiroo District, Hokkaido Prefecture, there are areas at night and when there is snow cover where image recognition reliability is poor. Trials have been conducted of a service that uses a magnetic marker system to follow two routes from the Cosmall Taiki roadside rest area, with fares actually collected from passengers.

- POINT**
- 15 services each day, with maximum of 17 passengers, and speeds of up to 40 km/h
 - Used by residents for a variety of reasons, including as daily transport and for transporting agricultural products to the roadside rest area
 - Planned for commercial operation by 2020

TOPICS

Magnetic marker system

The magnetic marker system is a unique Aichi Steel technology that enables vehicle position to be estimated with a high degree of precision. Magnetic sensors (MI sensor modules) are attached to the underside of buses or other vehicles to detect the very weak magnetism from magnets (magnetic markers) laid along travel routes. In this way, the system enables stable autonomous driving in bad weather, snow and tunnels where GPS- and camera-based autonomous driving may be difficult.

