
KIAPI

Korea Intelligent Automotive parts
Promotion Institute

Responding to the development of
next-generation automobiles

Support for automobile-related companies
and research institutes

Testing agency

KIAPI

Korea
Intelligent Automotive parts
Promotion Institute

www.kiapi.or.kr

KIAPI 지능형자동차부품진흥원
Korea Intelligent Automotive Parts Promotion Institute

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Be the BEST, KIAPI
Biggest Engineering
Service Team

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Steering pad track
- Radius : 85M
- Specification : ASTM E274

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01 / Message from president



Be the BEST, KIAPI

Biggest Engineering Service Team

KIAPI(Korea Intelligent Automotive Parts Promotion Institute) is an vehicle testing institute established in 2014 to support related parts suppliers and research institutes developing next-generation automotive technology.

Considering that the development of next-generation vehicles, which consist of intelligent vehicles centered on autonomous vehicles and green cars such as electric cars and hybrid cars, are major activities of automotive companies, In order to facilitate the development of next-generation automobile technology in Daegu region, we have vehicle evaluation and testing facility and work on the needs of companies and research institutes.

We have facilities and test engineers to test chassis dynamo, impact durability test equipment, vehicle driving test in various conditions such as High speed track and Multi-purpose test road.

In particular, test facilities such as autonomous driving test tracks for testing autonomous vehicles and Advanced Driver Assistance Systems(ADAS), precision maps, test equipment for Euro NCAP, cold chamber and ramps for electric vehicle performance tests are secured, and tests in the field of future vehicles are being carried out. Also, testing facilities are being expanded.

We will not only have a support system to cope with various next-generation automobile development of automobile-related companies and research institutes centered on Daegu region, but will continue to reinforce the support system in accordance with the changing market conditions in the future.

From president

02 / Summary of KIAPI

Purpose of establishment

Contributing to the strengthening and development of international advanced competitiveness of High premium auto parts industry and related business through infrastructure construction and efficient management and operation to foster the rights of auto parts makers and to foster ITS-based automotive parts base valley

Summary of foundation

Denomination : Korea Intelligent Automotive parts Promotion Institute
Form of establishment : non-profit Foundation under Civil Code No. 32 / 2008. 05. 06

Organization : 5 Headquarters

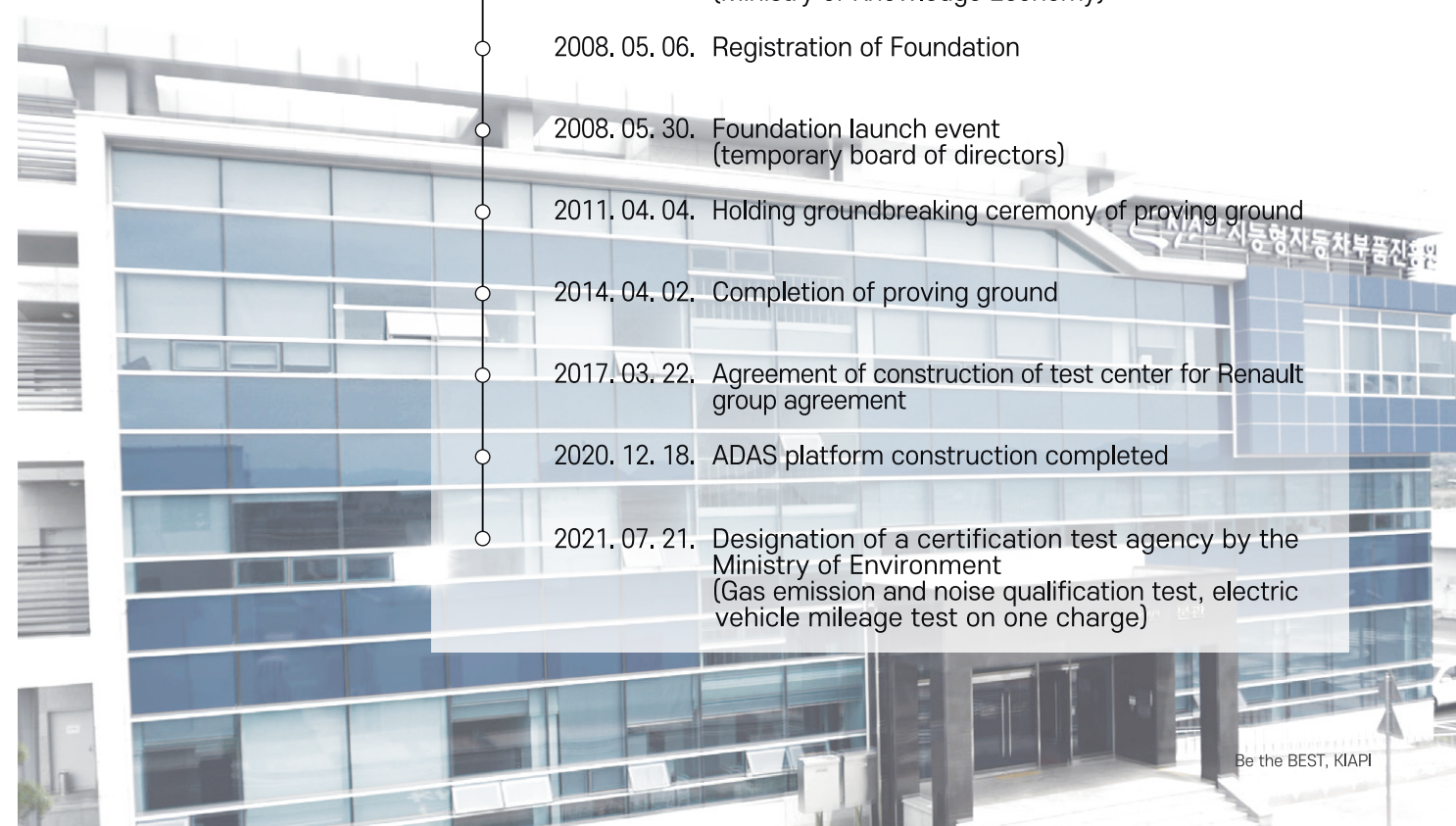
Status of proving ground

Location : 201, Gukgasandanse-ro, Guji-myeon, Dalseong-gun, Daegu, 43011, KOREA

Scale : test track of 413,564m² and operation of related equipment

History

- 2007. 12. 24. Conclusion of a contract for establishing infrastructure for regional innovation
- 2008. 04. 02. Permission to establish corporation (Ministry of Knowledge Economy)
- 2008. 05. 06. Registration of Foundation
- 2008. 05. 30. Foundation launch event (temporary board of directors)
- 2011. 04. 04. Holding groundbreaking ceremony of proving ground
- 2014. 04. 02. Completion of proving ground
- 2017. 03. 22. Agreement of construction of test center for Renault group agreement
- 2020. 12. 18. ADAS platform construction completed
- 2021. 07. 21. Designation of a certification test agency by the Ministry of Environment (Gas emission and noise qualification test, electric vehicle mileage test on one charge)



03 / Panorama of KIAPI & Daegu proving ground



The Daegu proving ground helps local auto parts makers overcome regional limitations due to changes in internal and external conditions and achieve stable development and continuous growth by supporting the evaluation of products developed by local auto parts makers.

General status of Daegu proving ground

Korea's first ITS-based driving test site with WAVE wireless communication network facilities.

- Total area : 413,564㎡ (50 times the size of a soccer field)
- Width : 1.8km
- Vertical width : 250m
- Test road : 31 types in total
- Wireless communication : WAVE operation at all test sites

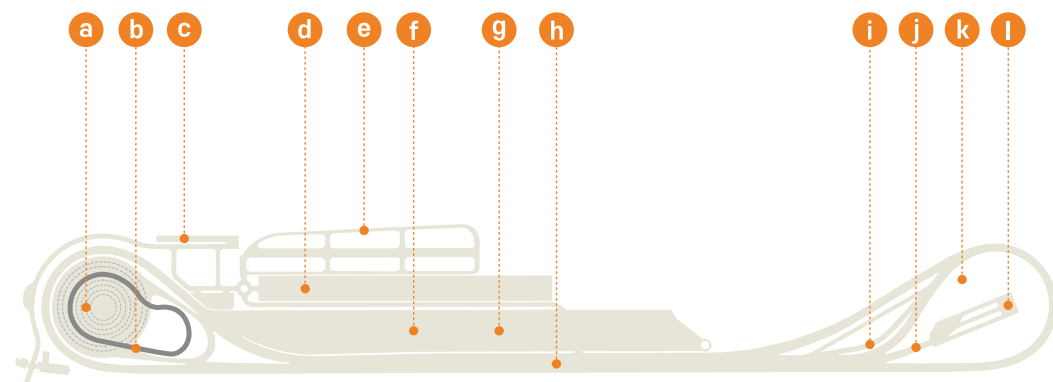
Major business

- Establishment of proving ground, management and operation of facility
- Performance test, research, evaluation and certification of automobile parts using proving ground
- Technical support and professional training of intelligent auto parts
- Construction of Infrastructure and R&D for development of intelligent automotive parts
- Automobile parts related business entrusted by the government or local government

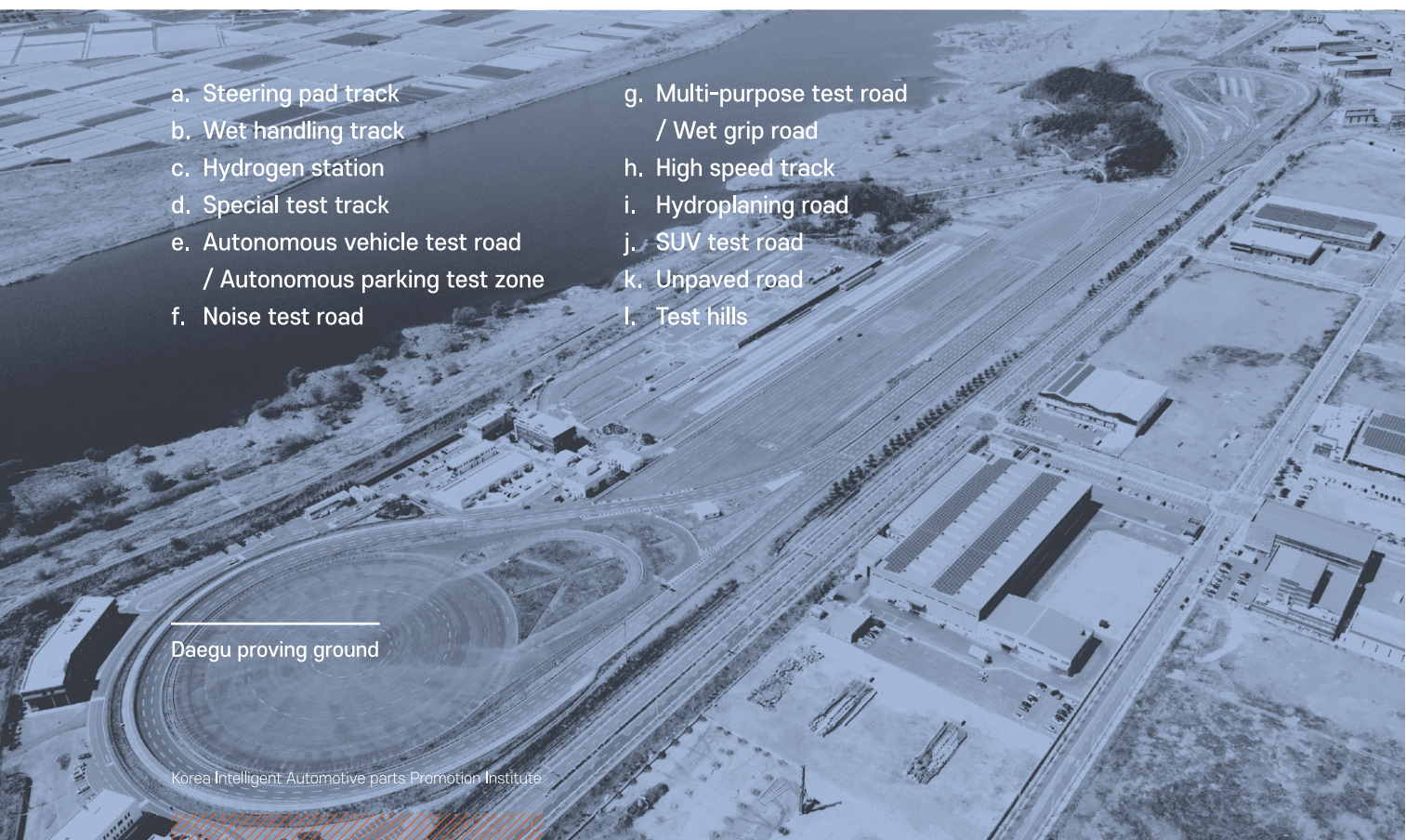
04 / Daegu proving ground infrastructure

Daegu proving ground is can carry out 37 items among test items of International Standard Certification Standard (ISO/TC) for intelligent auto parts and ITS specialized test of future cars. We also perform combined environmental tests such as performance, durability and noise of general vehicles.

In particular, for the first time in the world, we have installed the most advanced intelligent transportation system that enables DSRC and WAVE technology, the next-generation wireless traffic communication, to test and provide information services between vehicles and between vehicles and centers.



- a. Steering pad track
- b. Wet handling track
- c. Hydrogen station
- d. Special test track
- e. Autonomous vehicle test road / Autonomous parking test zone
- f. Noise test road
- g. Multi-purpose test road / Wet grip road
- h. High speed track
- i. Hydroplaning road
- j. SUV test road
- k. Unpaved road
- l. Test hills



Introduction to driving test tracks

a. Steering pad track

Evaluation of turning ability under various conditions, stability during turning, braking ability during turning, etc.
 Radius : 85m
 Specification : ASTM E274



b. Wet handling track

Test tire characteristics and vehicle steering characteristics, etc. on wet road surfaces
 Radius : 30, 50, 60m
 Specification : road width 6m, water film 1mm



c. Hydrogen station

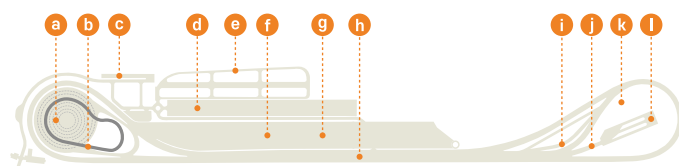
Direct charging method
 Charging pressure : 70Mpa



d. Special test track

Environmental test road :
 Dust tunnel, Water tight test road, Salt spray corrosion road, Flooding test road, Deep water ford road (5 types)
 Endurance test road :
 Belgian road, Long waveform road, Pebble road, Road noise road, etc. (12 types)





e. Autonomous vehicle test road / Autonomous parking test zone

Utilized for performance tests related to autonomous driving and ADAS through simulation, etc. of city road
 Composition : road facilities(Building surface, etc.) and parking facilities for autonomous driving tests on 4-way, 3-way intersections and special roads(gutters, bumpers, sidewalk blocks, etc.)



f. Noise test road

A test that measures external and internal noise generated while driving a vehicle
 Specification : ISO 10844 / 2014 Certification



g. Multi-purpose test road / Wet grip road

Length 730m x width 70m
 Multi-purpose test road : various comprehensive performance tests that are difficult to perform in a high speed track(straight lines) and various lanes of Republic of Korea, European, and North American standards are available for ADAS-related tests
 Wet grip road (0.5 ~ 1.5mm water film)
 Specification : UN Regulation No.117 Certification (Friction coefficient 0.6 ~ 0.8)



h. High speed track

Composed of a straight portion and a bank portion of a three-lane one-way road
 Straight portion : max 1.5km
 Bank portion : radius of curvature R = 100
 Max speed : 204km/h driving possible



i. Hydroplaning road

Straight portion : length 150m x width 3.5m
 Curved portion : length 25m x width 6m
 Radius of curvature : R = 100
 Water film : about 8mm / 40 - 50 minutes lasting
 Tire characteristics, steering, hydroplaning test



j. SUV test road

A test track consisting of two types of gutter and cross bumper to evaluate the characteristics of SUV vehicles
 Length 45m x width 3m
 Composition : -10cm gutter 12 places / +30cm 3 places



k. Unpaved road

Evaluation of vehicle durability performance under severe conditions on unpaved roads, etc.
 Total length : about 1km
 Hill road (up-down) about 300m / Curved portion about 400m



l. Test hills

Slope : 12%, 20%, 30%
 Climbing ability, clutch, brake performance test, etc.
 Specification : slope 12% 84m / slope 20% 41m / slope 30% 36m



Introduction to autonomous driving proof road

Summary of proof road

Summary of construction I

- Establishment of an empirical evaluation environment as part of a project to develop empirical evaluation technology based on real roads for the reliability evaluation of autonomous driving technology

Business period I May 1, 2017 ~ December 31, 2021

Status of Technopolis road I

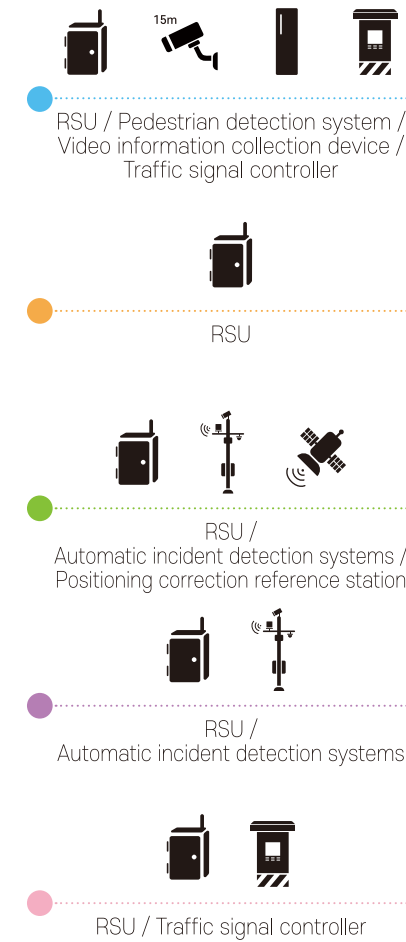
- Road name : Technopolis road
- Location : Daegok-dong, Dalseo-gu <-> Yuga-eup, Dalseong-gun
- Scale : 4 round-trip lanes (Width 20m), total length : 15.3km (12.95km of automobile road + 2.35km of city road)
- Major facilities : 6 tunnels, 9 bridges, 1 underpass, 4 intersections

Proof road construction roadside infrastructure

| Division | Quantity | Purpose of Installation |
|---|----------|--|
| RSU (WAVE + LTE) | 18 | Vehicle OBU and WAVE Communication |
| Radar - type AIDS (Automatic Incident Detection Systems) | 3 | Detect branching roads, confluence roads, and habitually congested sections |
| Video - type pedestrian detection system | 4 | Pedestrian detection at the crosswalk in downtown |
| Traffic signal controller | 4 | Provides traffic light cycle and SPaT (Signal Phase and Timing information) |
| Video information collection device | 2 | Test vehicle tracking and behavior information recording |
| Positioning correction reference station | 1 | Provide accurate location information using the DGPS principle |



Status of proof road infrastructure



Integrated control system

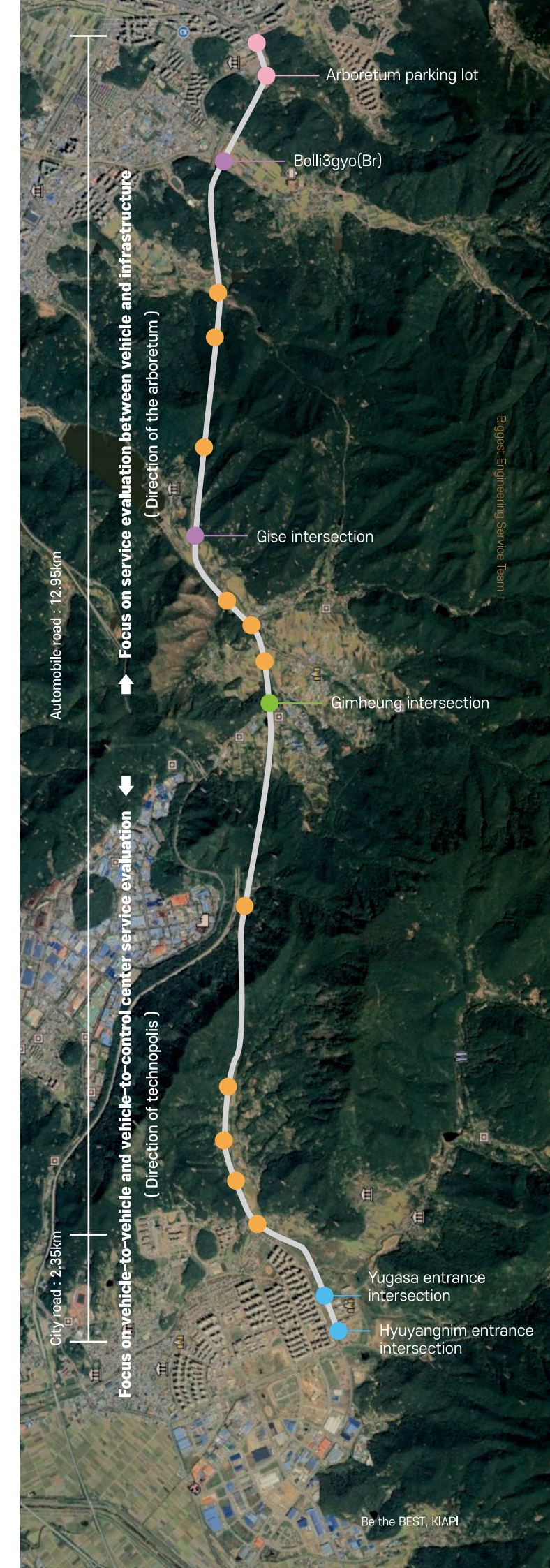


- Evaluate and analyze connected-based services / Development of operating system

Autonomous vehicle



- Development of connected service evaluation technology
- Implement a communication simulator
- Development of evaluation data collection system



Autonomous driving proof road representative system

As for the autonomous driving proof road, 6 types of roadside infrastructure were installed in Daegu Technopolis Road(12.95km of automobile road and 2.35km of city road) that satisfy various driving conditions required for autonomous driving evaluation. In addition, an integrated control center system is established in accordance with the C-ITS standard to monitor autonomous driving proof road section infrastructure and autonomous vehicles in real time, so it is possible to monitor and collect information necessary for autonomous driving empirical evaluation such as automatic incident detection systems, pedestrian detection system, and CCTV image information.

Proof road monitoring system

Real-time data collection monitoring of test vehicles driving in the proof road section, location information tracking reflection of precision maps, SPaT(Signal Phase and Timing information), and CCTV display system for major sections



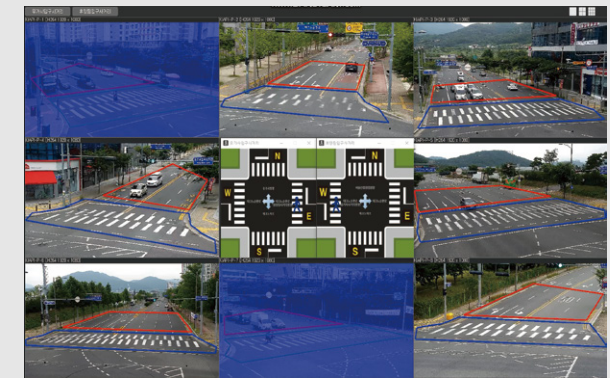
Automatic incident detection systems

A system that transmits event data on unexpected situations detected through the radar sensor to the autonomous vehicle and integrated control center using RSU's WAVE communication protocol



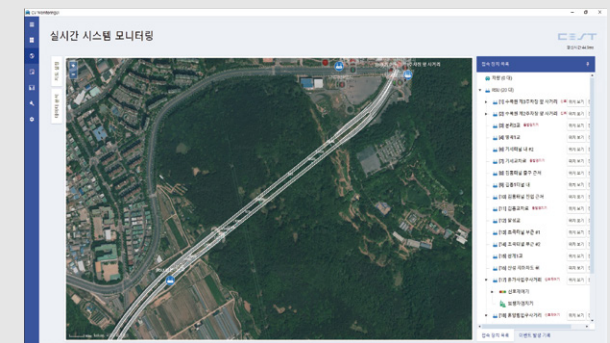
Pedestrian detection system

A system that transmits pedestrian data detected by image processing techniques to autonomous vehicles and integrated control centers using RSU's WAVE communication protocol



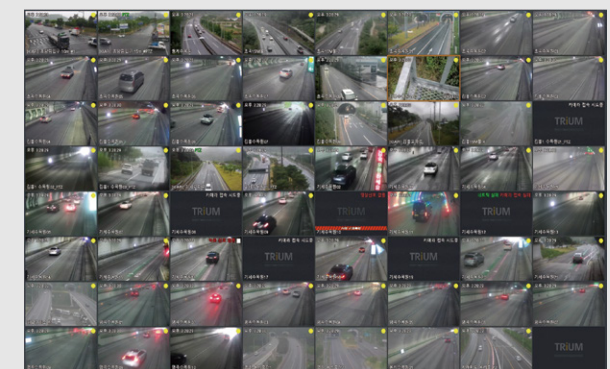
Connected vehicle monitoring system

Real-time driving information analysis of general vehicles and autonomous vehicles, communication(pattern/traffic /message usage frequency) data-based analysis system of connected vehicles



Video management system

A system for monitoring the entire road condition within the proof road section at the control center through CCTV



Introducing the ITS(Intelligent Transport Systems) device test environment

ITS device test environment

A test environment for various ITS devices that can not be tested on real roads is established.

High speed driving environment

- 1.5km Straight portion
- Able to drive up to 204km/h
- Have 6 round-trip lanes
- Possession of pole for device installation (15m)
- Dedicated network available



Urban environment

- Two 4-way intersection, one 3-way intersection
- Total length 382m x width 16.5m
- Have 4 round-trip lanes
- Possession of WAVE V2I communication system (SPaT)
- Possible to conduct various tests using crosswalks
- Possession of pole for device installation (15m)
- Dedicated network available



Analysis room

- Provides a dedicated network for communication with external devices
- Dedicated place for testing and analysis of devices installed outside



ITS device test subject(example)

Automatic Incident Detection Systems (AIDS)

- Equipment that automatically detects unexpected event types such as 'stopped vehicles', 'reverse driving vehicles', 'falling objects', 'pedestrians', and 'moving objects' that randomly occur on the road.

※ In the case of performance evaluation of the AIDS, various emergency scenarios such as stationary vehicles, falling objects, pedestrians, and moving objects are carried out, and the evaluation is conducted in sections where general vehicles do not pass due to the risk of traffic accidents reenacting unexpected scenarios.



Vehicle Detection System (VDS)

- Equipment installed on roads to collect traffic data such as traffic volume, speed and occupancy rate.



Traffic Signal Controller (TSC)

- Testing in connection with various ITS devices, roadside infrastructure, etc., and traffic signal controllers.



Introducing the energy infrastructure of the KIAPI

Summary of energy infrastructure / EV

Applications

- Support for charging electric vehicles and electric motorcycles and testing parts
- Research on energy-related technologies such as microgrids and BEMS
- V2G charging and discharging technology and vehicle related test support

Test support facility(EV)

Electric vehicle charging station



| | | | | |
|------|-----------------------------------|------|---------|------------------------|
| Fast | DC CHAdeMO | 50kw | 2 units | Inside parking lot |
| | AC3 phase / DC combo / DC CHAdeMO | 50kw | 2 units | Front gate parking lot |
| Slow | 5-pin | 7kw | 7 units | Inside parking lot |

PV-ESS battery replaceable charging station (including 10kWh solar photovoltaic power station and ESS)

Energy Storage System (ESS)



(Including 100kW PCS)

Bi-directional on board charger



DC CHAdeMO type bi-directional electric vehicle charger(2 units)
(Charge : 50kW / Discharge : 20kW)

Solar photovoltaic power station (PV)



100kWh solar photovoltaic power station

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Summary of energy infrastructure / Fuel Cell

Applications

- Fuel cell electric vehicle charging support and related parts research
- Support research related to hydrogen energy technology (fuel cell demonstration and heat recovery)
- Smartgrid, microgrid research using fuel cells

Hydrogen station

- Using diaphragm type compressor
- Direct charging method
- Hydrogen storage capacity of about 120kg
- 70Mpa fuel cell electric vehicles can be charged
- It takes about 8 minutes to charge 1 passenger car (Tucson / Nexo)

Hydrogen fuel cell

- Phosphoric Acid Fuel Cell (PAFC)
- Power generation capacity : 25kWh (2 units of 10kWh / 5 units of 1kWh)
- Hydrogen supply pressure : 0.1 ~ 0.2Mpa
- Hydrogen consumption : 0.667m³/h (per 1kW)



Hydrogen station
 Fill pressure 70Mpa
 99.0Mpa 2-stage piston type compressor
 103.4Mpa / 55.0Mpa storage tank

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05 / Main test evaluation items & Equipment

TEST & EVALUATION DIVISION

The testing and evaluation headquarters provides various services such as testing, analysis, and interpretation for companies by utilizing driving test sites, various test equipment, and experienced engineers. We perform development and certification tests required by companies, and support cause analysis and improvement measures for problems(noise, riding comfort, etc.) that occur during the development process.



KOLAS accredited testing institute

Maintenance / management of administration system in accordance with ISO 17025

Automotive field (ADAS test)

- Test Specification : EUROPEAN NEW CAR ASSESSMENT PROGRAMME (EuroNCAP Version 3.0.2 July 2019)
- Range : Car-to-Car Rear stationary-AEB, FCW

Vibration field (vibration test)

- IEC 60068-2-6 Edition 7.0 : 2007
- IEC 60068-2-64 Edition 2.0 : 2008
- KS C IEC 60068-2-27 : 2010
- KS R 1034 : 2006

Gas field (exhaust gas test)

- Test Specification : announcement on energy consumption efficiency of automobiles, greenhouse gas emissions and fuel consumption rate test methods, etc.



ADAS, ADS performance evaluation and specification test

Tests of Domestic and International Standards for ADAS(Advanced Driver Assistance Systems) and ADS(Autonomous Driving Systems)

- EuroNCAP, KNCAP, CNCAP, NHTSA, IIHS etc.
- UNECE Regulation, performance evaluation of regulations such as domestic safety standards (ALKS, LDWS, LKAS, BSD, AEBs, etc.)
- Performance Evaluation of Customization Scenarios



ADAS, ADS scenarios

ADAS, ADS function test support

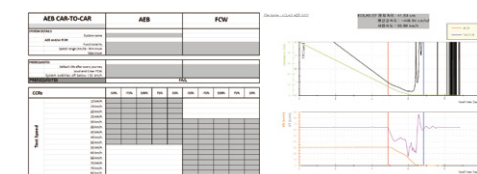
- AEBs(Automatic Emergency Braking System)
- FCWS(Forward Collision Warning System)
- LDWS(Lane Departure Warning System)
- LKAS(Lane Keeping Assistance System)
- ACC(Adaptive Cruise Control)
- ESF(Emergency evasion Steering Function)
- ALKS(Autonomous driving Lane Keeping System) etc.



Actual vehicle test and data measurement

Proving Ground-based ADAS, ADS test equipment operation

- Guided Soft Target (GST)
- Soft Pedestrian Target (children, adults, bicycles, etc.)
- Acceleration Robot, Braking Robot, Steering Robot



Data analysis



MOLIT vehicle regulations & Car performance test carried out

KMVSS test

MOLIT automobile regulations test (rules on performance and standards of automobiles and automobile parts)

- Speedometer, steering performance, braking ability, vehicle stability control system, advanced emergency braking system, Lane Keeping Assistance System, Acoustic Vehicle Alert System, accelerated driving noise, horn noise, tire pressure warning system, tire burst test, lighting system, seat belt warning system, rear pedestrian safety system, etc.
- Conducting regulatory tests for each type of vehicle, such as micro cars, passenger cars, and trucks



Automobile dynamic characteristics and durability evaluation (R&H, RLDA, ride comfort)

Steering stability performance evaluation

- ISO-based evaluation such as Step Steer, Double Lane Change, On-Center Handling, Steady state circular, Sine dwell, etc.
- Quantitative and repetitive evaluation and analysis of test results using driving robots and/or Data Acquisition device.



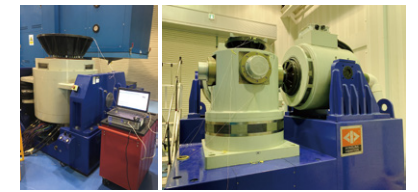
Actual vehicle-based ride comfort and durability evaluation

- Load evaluation after sensorization(strain gauge) for each part is installed
- Comparative evaluation of riding comfort before and after installation of shock absorber, bush, chassis parts, etc.
- Evaluation and analysis of severity with real roads for each part

Vibration test(single-axis & 3-axis)

Single-axis/3-axis vibration endurance test for auto parts and modules in combined environments

- Acquired KOLAS accreditation
- Resonance frequency detection and analysis for each part
- Combined vibration durability and mechanical shock test evaluation
- Field Data Replication
- Vibration durability + Vibration data acquisition (up to 144 channels)
- Performance evaluation and analysis for OEM requirement and international standards



NVH test

- Vehicle parts and system noise & Vibration analysis and performance improvement
- Actual vehicle BSR evaluation and Global & Local vibration characteristics comparison
- Frequency Response Function(FRF) for each system, Mode Shape analysis
- EMA (Experimental Modal Analysis)
- ODS (Operational Deflection Shape)
- TPA (Transfer Path Analysis)



Development & Performance test

Actual vehicle-based development & performance test using proving ground and real road

- Whole vehicle-based development tests such as actual vehicle durability test, steering test, braking test, acceleration performance test, maximum speed test, vehicle stability, vehicle acceleration and sound quality, and climbing ability for each vehicle conditions



Ministry of Environment certification test agency

Certification processing

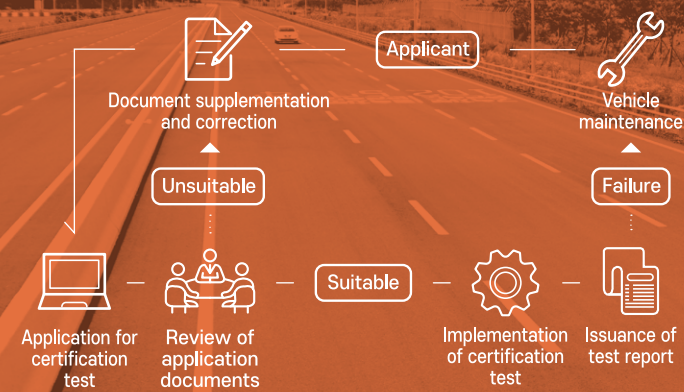
- Certification Authority :
Ministry of Environment(new certification of domestic cars),
Transportation Environment Research Institute(domestic car certification change and imported car), Korea Environment Corporation(certification test, certification omitted)
- Test institute : Korea Environment Corporation
- Certification test agency : KIAPI

Subject to certification application

- A person who manufactures or imports automobiles
- Domestic production company :
A person who manufactures automobiles in Korea
- Official importer :
A person who imports a vehicle by signing an exhaust gas guarantee contract with a foreign manufacturer
- Parallel importer(person) :
A person who imports a car from a non-foreign manufacturer (no emission guarantee contract)

- Ministry of Environment certification test application site <http://ev.kiapi.or.kr/> (linked to the certification test of the Ministry of Environment on the KIAPI website)
- Inquiry
+82-53-670-7857 (exhaust gas/electric vehicle certification test)
+82-53-670-7851 (noise certification test)

Certification test agency procedure



High speed track

- Straight portion : max 1.5km
- Bank portion : radius of curvature R = 100
- Max speed : 204km/h driving possible

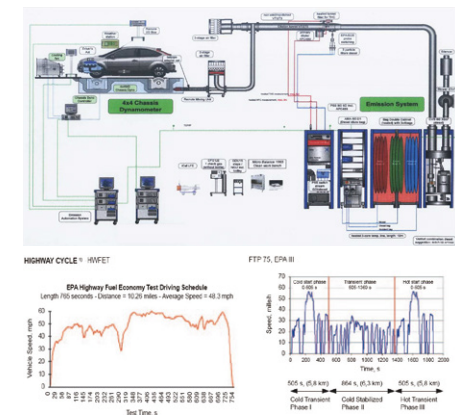
Exhaust gas certification test

Related laws

- Atmospheric environment conservation act
- Regulations on manufactured vehicle certification and inspection methods and procedures
- Regulations on manufactured vehicle test inspection and procedures

Test item

- Exhaust gas certification for individual imported vehicles
- Gasoline vehicle exhaust gas test



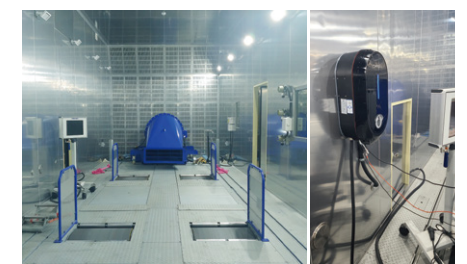
Electric vehicle certification test

Related laws

- Atmospheric environment conservation act
- Regulations on manufactured vehicle certification and inspection methods and procedures
- Regulations on manufactured vehicle test inspection and procedures
- Regulations for evaluation of electric vehicle supply targets

Test item

- Driving distance on one charge (SCT, MCT)
- Some of the evaluation items for electric vehicle supply targets (climbing performance, interlock safety device, charging standard, charging speed, charging status display, battery discharge warning, etc.)



Noise certification test

- Enforcement decree of noise and vibration control act
- Regulations on manufactured vehicle certification and inspection methods and procedures
- Regulations on manufactured vehicle test inspection and procedures

Test item

- Accelerated driving noise
- Horn noise
- Exhaust noise



Main test evaluation equipment

Unmanned soft vehicle target

Usage purpose

- Global NCAP vehicle target, autonomous driving test vehicle target

Main specifications

- Max speed : 80km/h, Max deceleration : 0.8g
- Max lateral acceleration : 0.4 ~ 0.5g



AEB Soft pedestrian target

Usage purpose

- Global NCAP pedestrian target, pedestrian target for autonomous driving test

Main specifications

- Adult, Child, Bicyclist NCAP Target System



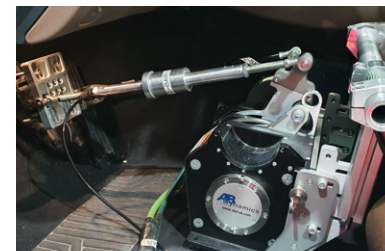
Brake & Accelerator pedal robot(CBAR, AR, BR)

Usage purpose

- Brake and accelerator pedal control robots during legal tests such as NHTSA, EuroNCAP, ISO, etc.

Main specifications

- Vehicle Speed, Brake pedal force, Pedal travel, Vehicle deceleration, Brake line pressure precise control



Automatic steering robot(SR60, SR15)

Usage purpose

- Steering control robot during legal tests such as NHTSA, EuroNCAP, ISO, etc.

Main specifications

- Steering angle, torque control and measurement
- Path Following System, precision path control



Vehicle dynamic characteristics measurement equipment(RT, RT range)

Usage purpose

- High-precision GPS/INS equipment for measuring vehicle dynamic characteristics(position, velocity, acceleration, etc.) information

Main specifications

- Location accuracy $\leq 3\text{cm}$
- Speed accuracy $\leq 0.05\text{km/h}$
- Operating temperature : $-10 \sim 50^\circ\text{C}$
- Measurement range of internal accelerometer(3-axis intergration) $\leq 10\text{g}$



EV AVAS(VESS) evaluation system

Usage purpose

- Acoustic Vehicle Alert System Test (MOLIT)

Main specifications

- Range of speed measurement : 0.8km/h ~ 480km/h, 0.005km/h
- Range of noise measurement : more than 50mV/Pa, more than 3.75Hz ~ 20kHz



Single axis/3 axis vibration combined environmental test system

Usage purpose

- Single axis/3 axis vibration durability test of automobile parts and modules in combined environment

Main specifications

- Frequency range : (5 ~ 2,000) Hz
- Test type : Sine, Random, Shock, SOR, ROR Vibration



4-wheel drive integrated simulation system

Usage purpose

- Measurement of vehicle exhaust gas and energy consumption efficiency

Main specifications

- Range of inertia weight : 500 ~ 3,500kg
- Allowable wheelbase : 2,000 ~ 3,500mm



Active safety system testing equipment

Usage purpose

- Evaluation & analysis for vehicle dynamic characteristic and active safety system

Main specifications

- Wheel speed sensor 4ea / Pedal load cell 2ea
- Steering wheel sensor 1ea / Optical speed sensor



Driving force measurement system for intelligent vehicles and parts

Usage purpose

- Measurement of three forces and moments acting on a rotating wheel

Main specifications

- Wheel Force Transducer 2ea
- Max load : 28kN (Fx & Fz), 15kN (Fy)



Actual vehicle load data collection and analysis system

Usage purpose

- Measurement of actual vehicle load data and analysis of fatigue durability

Main specifications

- H/W : Somat eDAQ 32ch.
- S/W : nCode Version 7.0



06 / Future mobility R&D

Leaping forward as an institution specializing in future car evaluation

KIAPI is striving to become a professional evaluation agency for future automobiles. To this end, we are developing autonomous driving evaluation technologies such as the development of autonomous vehicles and simulators for evaluation and the creation of an evaluation environment, and are carrying out a number of related national tasks. In addition, in order to ensure the reliability of autonomous driving evaluation technology, we are active in the United Nations for mobility testing and standardization, such as the International Alliance for Mobility Testing and Standardization(IAMTS).

Autonomous vehicle test road

Major activities of IAMTS member companies



International standards and standard development and coordination for autonomous driving test methods

Methods and standards related to ICV(Intelligent Connected Vehicle) testing

- Development of test methods for intelligent connected vehicles
- Development of test scenarios and verification methods
- Development of test environment considering both users and operators

Major member companies

- SAE, IEEE, NVIDIA, Mcity, CATARC, SIAC, ITIC, etc.



- WG1 Global Scenario Library
- WG2 Global Advanced Mobility Testbed Database
- WG3 Correlation of Physical and Virtual Testing
- WG4 Automotive Cybersecurity Testing and Validation

Research on autonomous vehicles for evaluation purposes

In order to secure the reliability of autonomous driving technology, it is necessary to develop autonomous driving vehicles. To this end, in order to develop autonomous driving vehicles capable of cognition / determination / control, we are developing sensor algorithms for recognition such as cameras, lidar, and GPS, and striving to develop autonomous vehicles equipped with these sensors that can be evaluated.



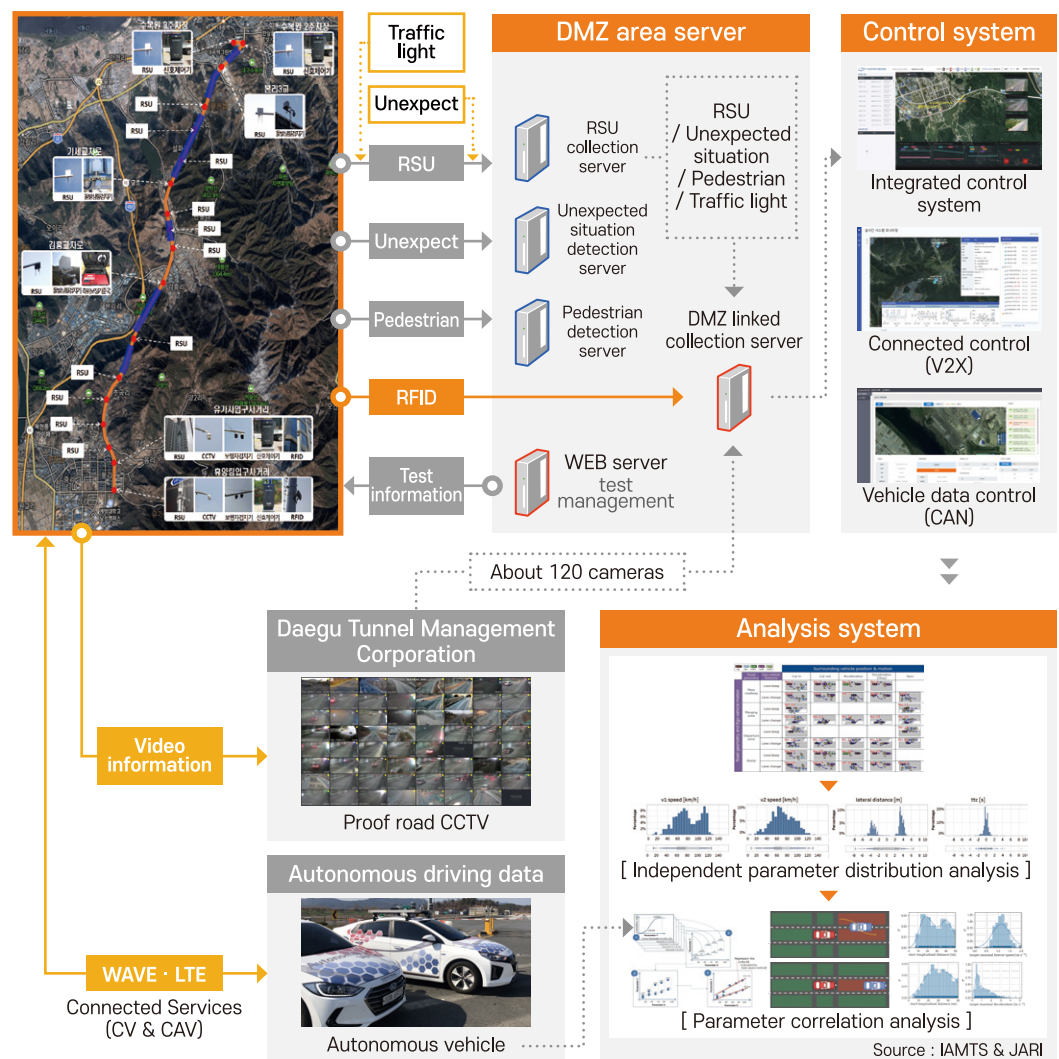
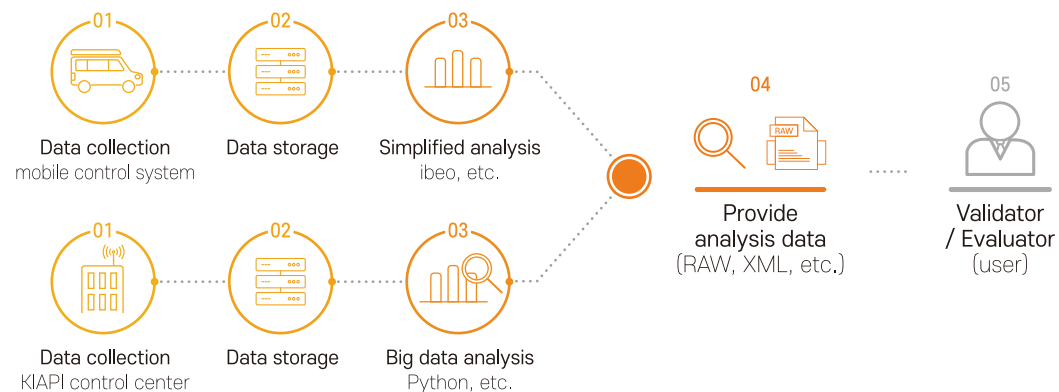
Research on autonomous driving simulator for evaluation purposes

In order to evaluate autonomous driving technology capable of responding to various driving environments, including unexpected situations, obstacles, and weather conditions that may occur on the road, the KIAPI uses digital technologies such as HiLS(Hardware in the Loop System) and ViLS(Vehicle in the Loop System). Equipment is built and operated so that it can be tested in a digitally twin environment.



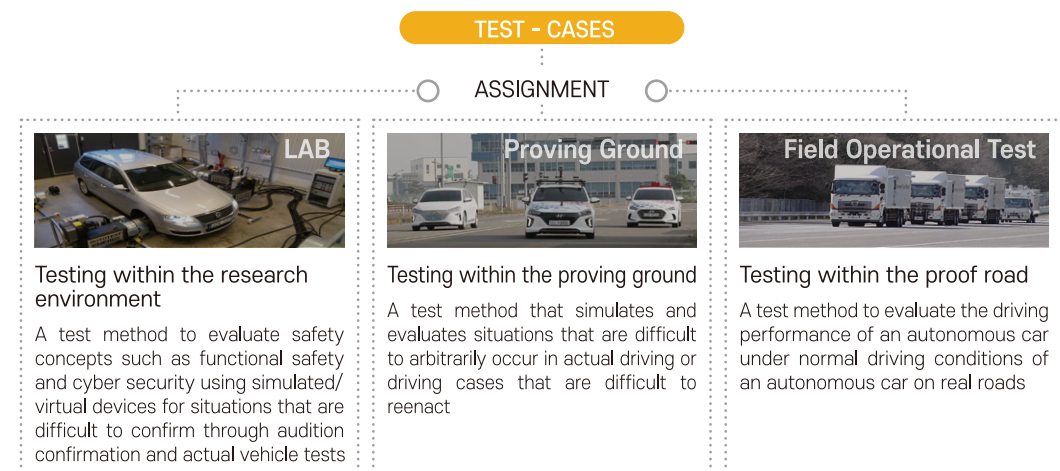
Creation and operation of autonomous driving evaluation environment

The KIAPI has built various evaluation equipment on real roads for self-driving vehicle evaluation based on real roads, and through this, has laid the foundation for self-driving evaluation from a third-person perspective. In addition, we are preparing for the era of future automobiles to come by establishing a control system that can collect, manage, and operate data of general vehicles and autonomous vehicles in real time.



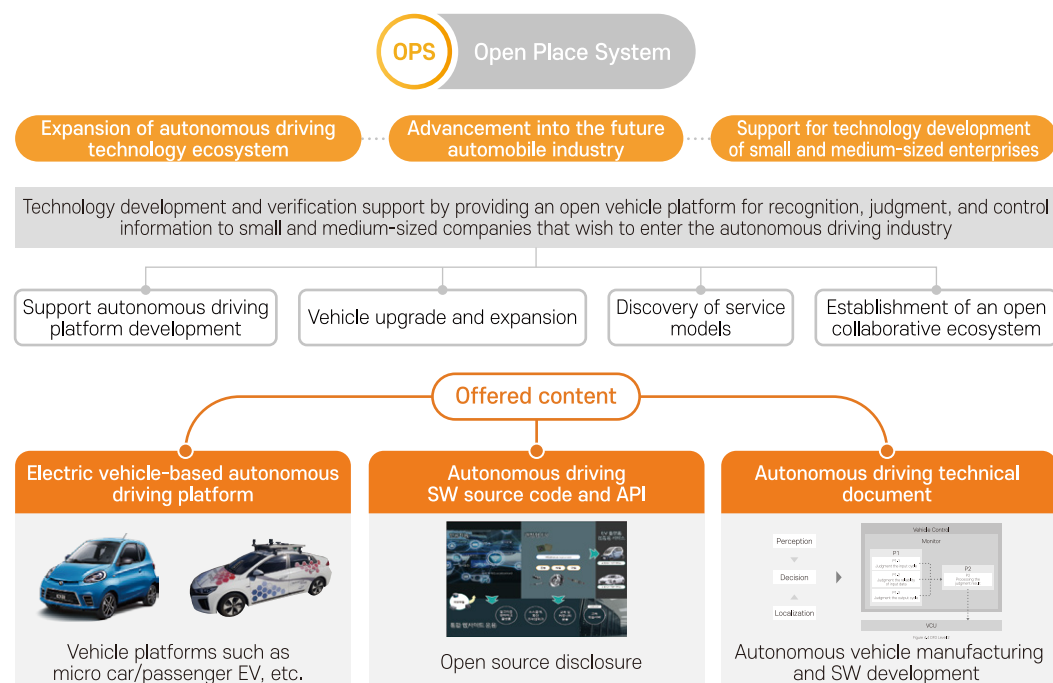
Development of autonomous driving evaluation technology

Autonomous driving technology generally undergoes LAB evaluation(simulator), P.G evaluation, and actual road evaluation, and it is necessary to verify the reliability of autonomous driving systems and parts such as algorithms and sensors. To this end, the KIAPI is developing autonomous driving evaluation technology by referring to domestic and international standards and safety evaluation criteria such as EuroNCAP. In addition, we are striving to lead autonomous driving evaluation technology through IAMTS international standardization activities.



Operation of OPS to expand autonomous driving technology ecosystem

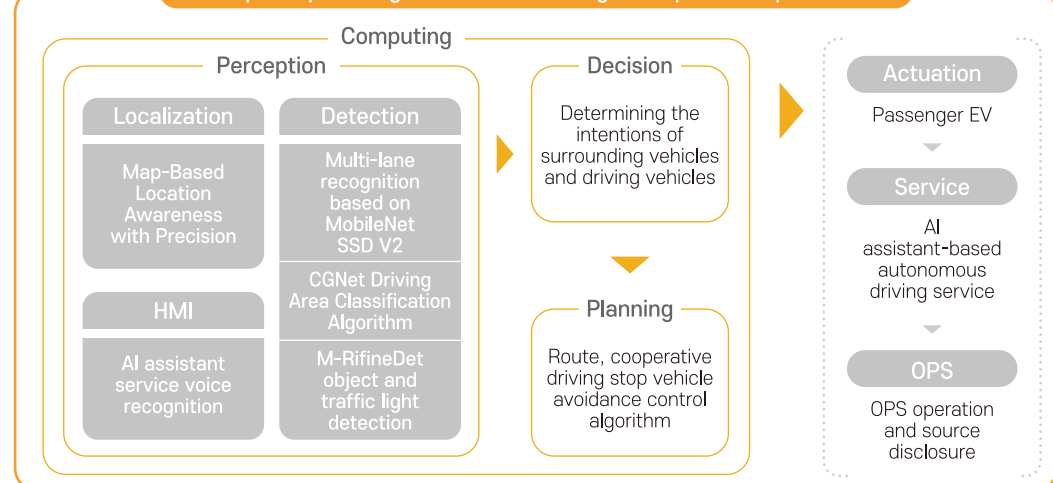
We operate an Open Place System that can provide platform development technology, open source of autonomous driving SW, and documents on autonomous vehicle manufacturing technology to support technology development of small and medium-sized companies that want to enter the autonomous driving industry.



OPS disclosure plan(example)

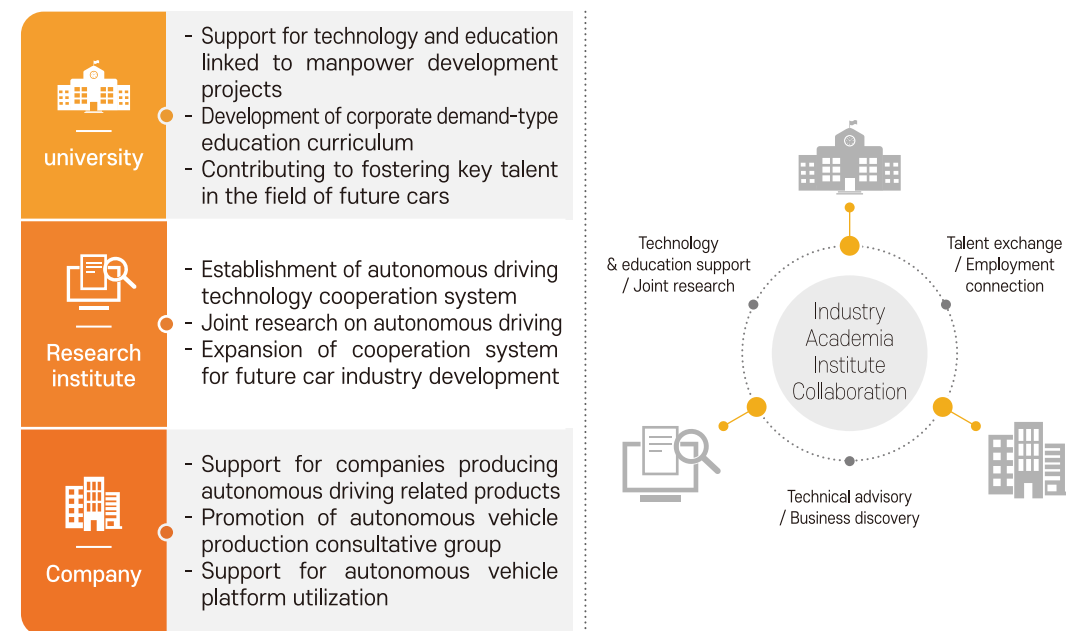


Example of providing functions according to corporate requirements



Establishment of industry-academy-institute collaboration foundation in the field of future automobiles

Through the activities of industry, academia, and research organizations in the future mobile sector, we are continuously promoting activities to create and revitalize ecosystems such as supporting human resources development projects, joint research on technologies applied to future vehicles, and cooperation and support for autonomous driving technology development.

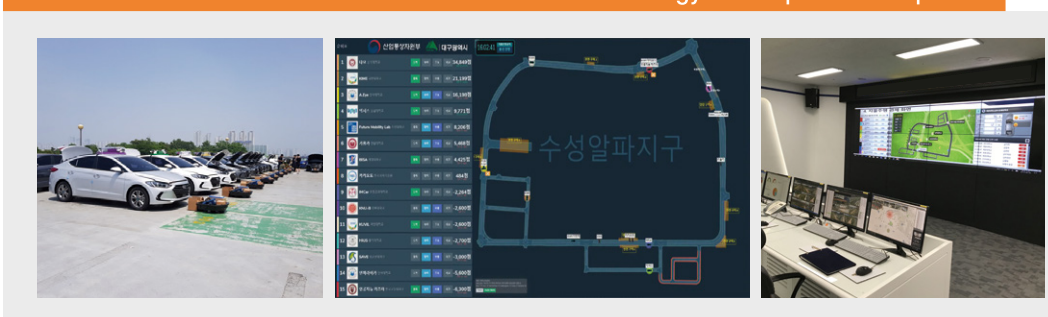


Biggest Engineering Service Team

Education and technical support for the 2022 university student self-driving contest



Collaboration with autonomous vehicle and V2X technology development companies



07 / Corporate support

Daegu Future Mobility Transition Support Center

Control tower to support future mobility transition for local companies

Purpose of operation

- Support for speedy transition of future vehicles to mobilize local companies and institutions' capabilities and intensively nurture the future mobility electric parts industry
- Expansion of the new ecosystem of future mobility and strengthening solidarity cooperation of consultative group
- Establishment of a base for collaboration between industry, academia, research institute, and government

Major tasks

One-stop business support project operation and linkage support

Operation and connection support for business support projects such as technology development support(R&D), technology/commercialization(non-R&D) support, manpower/recruitment support, start-up support, financial support, equipment/infrastructure support, etc.

Provide newsletters, latest information and trends

Provide newsletters with the latest industrial technology trends every week through the KakaoTalk channel

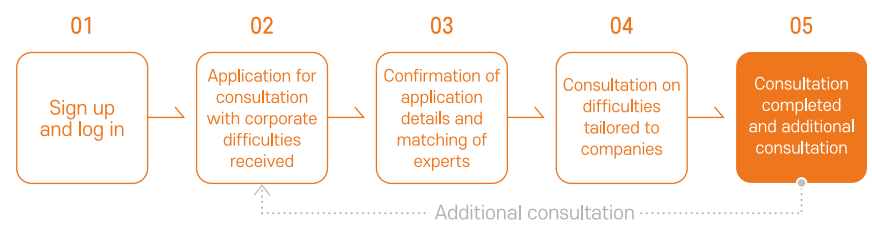
Operation of homepage and KakaoTalk channel

Announcement of the latest corporate support project, weekly latest technology trends newsletter, information of professional support organization, industry and policy data updates

Corporate difficulties counseling and expert advisory support

Support for expert advice and resolution of difficulties after applying for counseling on corporate difficulties through the website and Kakao Talk channels

* Process of difficulties counseling application



* Method of apply for difficulties counseling



- <http://d-fmts.or.kr>
- KakaoTalk channel : Daegu Future Mobility Transition Support Center

* Add KakaoTalk channel friends and join the corporate council now. You can get all this information and benefits.



Support agency

Administration / Financial and cooperative support

| | |
|---------|--|
| 대구광역시 | Administrative support for the general operation of the Future Mobility Transition Support Center and Council |
| 대구광역시의회 | Financial support for successful future vehicle transition of local parts companies |
| 대구상공회의소 | Expansion of future vehicle transition policies through collaboration with local governments and support organizations, jointly promoting fact-finding surveys |
| KIAP | Dedicated operation of the Daegu Future Mobility Transition Support Center / Close support for companies in connection with local institutions for future vehicle transition |

Consulting and R&D

| | |
|--------|--|
| Keit | Local co-prosperity consulting R&D consulting for local companies(Resolve technical difficulties), collaboration with local institutions, etc. |
| KATECH | Electronics / Autonomous driving R&D Discovery of future vehicle R&D tasks, international standard test evaluation support, development of industrial field education programs, etc. |
| KITECH | Future vehicle parts manufacturing technology R&D Joint planning and research of core parts development projects for future vehicle, Spread of development technologies |
| ETRI | Convergence industry R&D Consulting for local parts companies based on AI, robot, and autonomous driving convergence technology, support for overseas expansion in connection with the America Center |

Commercialization, sales channel development, start-up

| | |
|------|---|
| KIAP | Commercialization / Test evaluation, etc. Commercialization support, test evaluation support, human resource development, networking, provision of future vehicle transition information, etc. |
| DGTP | Commercialization, sales channel development Product commercialization, overseas market development, promising technology discovery and transfer support, fund investment, IR, IPO support, etc. |
| DGM | PM based R&D Parts localization technology development, commercialization support, overseas emerging market development |
| DIP | ICT/SW Convergence Commercialization and marketing support in connection with auto parts companies and ICT/SW companies, ICT/SW employee training |
| DGI | Startup / Funding Provides support for future vehicle start-ups, marketing support, and investment attraction opportunities |

Manpower development (including R&D)

| | |
|---------|---|
| 경북대학교 | - Fostering high-quality R&D manpower in connection with future vehicle + IT convergence department - Development of leading technologies in connection with university-owned human and material resources (autonomous driving SW, electric vehicle HW) |
| 계명대학교 | - Universities hosted by HuStar Innovation University Project(future vehicle field) - Develop field-customized curriculum and nurture professional manpower - Discovery of industry-academia-research R&D projects in connection with manpower training |
| DGIST | - Convergence R&D project planning in connection with the open innovation center in the field of future vehicles - Nurturing SW-centered control/design professionals |
| 영남이공대학교 | - Cultivation of future vehicles inspection and maintenance industry-oriented service personnel - Development and training of incumbent transition training programs to respond to the transition period of future vehicles |
| 영진전문대학교 | - Develop training programs for incumbents in the field of electric vehicles and nurture human resources through cooperation with local small and medium-sized enterprises - Future vehicle battery management system(BMS) research and development |

Policy finance, etc.

| | |
|----------|--|
| DGB대구은행 | As a regional representative bank, financial support for future vehicles transition through collaboration with local financial institutions |
| 대구신용보증재단 | Financial support centered on auto parts companies of 2nd and 3rd tier suppliers in response to the future vehicle transition period |
| KOSME | Policy fund support for future vehicle transition and scale-up (20 billion won goal) Support for future vehicle transition package in connection with the designation of 'Structure Innovation Support Center' for local industries |



Indian AIS certification supporting program for automotive parts manufacturers

Consulting and supporting Indian AIS certification businesses for companies

Purpose of operation

- Consulting and supporting domestic and regional companies regarding the mandatory certification and test reports that are required to export vehicles and related parts to the target countries
- Aiding companies to minimize the time and tasks and save the budget for overseas certification
- Currently, consulting and supporting the certification and tests specified in the Indian CMVR (Central Motor Vehicles Rules) based on the cooperation between KIAPI-ICAT

India AIS certification supporting program

Purpose of the program

KIAPI provides Indian AIS certification supporting program for automotive parts and products that are exported to the Indian market. With this program, KIAPI targets to solve problems and difficulties (communication with the institute, time and budget, unequal distribution of the institute, etc.) from the certification process and invigorate the automotive part exporting market.



Roles of KIAPI

As regards Indian AIS certification, KIAPI works as a representative partner of ICAT in Korea and Asia region and supports the whole process of the certification for products and/or factories which need to be certified to be exported to the Indian market. KIAPI keeps its best to minimize the time and fees related to the certification by cooperating with related institutes and expanding facilities.



Major tasks

Certification related consulting

- Providing consulting on certification or testing required by the country in relation to the export of vehicles and related parts
- Providing consulting on management and extension of existing test reports and certificates and obtaining new test reports and certificates for new vehicles and parts
- Consulting for testing and certification of vehicles and products according to other exports

Support of certification work

- Support for overall work(application, document submission and supplementation, responding to dispatch of auditors, delivery of final report, etc.) regarding the extension of existing test reports/certifications and the acquisition of new test reports/certifications

Support of the overseas expansion

- Support for connection to related organizations and companies in accordance with overseas expansion of the business
- Support for checking and verifying of the compliance of relevant laws and regulations of the target country

※ KIAPI provides Indian AIS certification related services currently

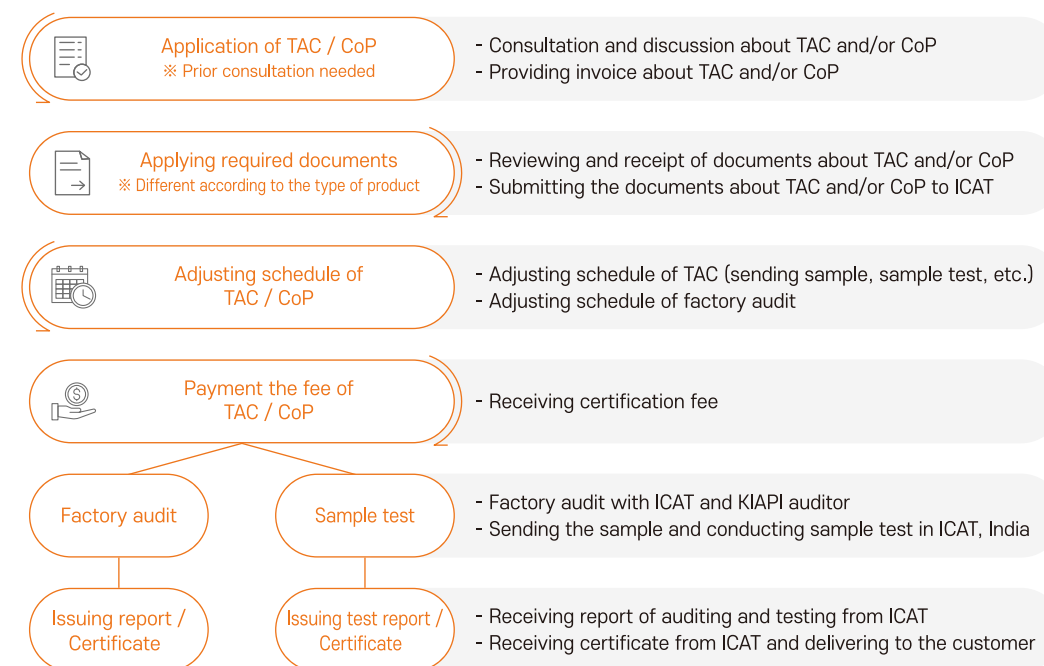
Main products and certification process

| | | | | | |
|----|---|----|-------------------------------------|----|--|
| 01 | Safety Glass | 02 | Brake Hose | 03 | Horn |
| 04 | Tyre | 05 | CNG Regulator | 06 | LPG Vaporizer / Regulator |
| 07 | Bulb | 08 | Rear View Mirror | 09 | Speed Limiting Devices |
| 10 | Seat Belt | 11 | Wheel Rims (M / N Category) | 12 | Light / Light Signaling Devices (M / N Category) |
| 13 | Retro Reflectors | 14 | Warning Triangle | 15 | Light / Light Signaling Devices (L Category) |
| 16 | Light / Light Signaling Devices (Agri. Tractors & CEVs) | 17 | Door Locks and Retention Components | 18 | Fuel Tanks |
| 19 | Reflective Tapes | 20 | Rear Warning Triangles | 21 | Replaceable LED Light Source |
| 22 | Wheel Rims (L Category) | 23 | Rear Marking Plate | 24 | Wiper Blades |
| 25 | Traction Battery [Lead Acid Type] (Battery Operated Vehicles) | | | | |

Through this program, we provide India AIS certification services for the above products.

※ Required fees and time periods are different depending on the products. Please contact the person in charge before the application for the certification.

* Certification process



- <http://kiapi.or.kr/overseas>
- Contact : +82-53-670-7825 / hongeik@kiapi.or.kr

08 / Partners

SL CORPORATION
 ERAE AMS CO., LTD.
 PYUNG HWA INDUSTRIAL CO., LTD.
 VALEO PYUNG HWA CO., LTD.
 PYUNG HWA OIL SEAL CO., LTD.
 KYUNG CHANG INDUSTRIAL CO., LTD.
 DONGWON METAL CO., LTD.
 MOTONIC CO., LTD.
 HWASHIN CO., LTD.
 SAMBOMOTORS CO., LTD.
 SANGSIN BRAKE CO., LTD.
 THN CO., LTD.
 KOREAPOWERTRAIN CO., LTD.
 ILJIN CO., LTD.
 PHA CO., LTD.
 SEWON PRECISION CO., LTD.
 ILJI TECH CO., LTD.
 TAE CHANG INDUSTRIAL CO., LTD.
 SEMYUNG INDUSTRIAL CO., LTD.
 AJIN INDUSTRIAL CO., LTD.
 HYOLIM INDUSTRIES INC.
 TAE CHUL INDUSTRIAL CO., LTD.
 KOREA SINTERED METAL CO., LTD.
 KIRIU-SAMICK CO., LTD.
 CHASYS. CO., LTD.
 FUSIONSOF. CO., LTD.
 DAEREE PRECISION CO., LTD.
 NAMSUN ALUMINUM CO., LTD.
 SHIN YOUNG METAL CO., LTD.
 KUNHWA ENG CO., LTD.
 GUYOUNG TECH CO., LTD.
 SAMYOUNG INDUSTRIAL CO., LTD.
 SAMWOO PRECISION CO., LTD.
 SHINWHA PERCISION. CO., LTD.
 YOUNGJIN CO., LTD.
 DATWYLER HOLDING INC.
 GUMCHANG CO., LTD.
 SEWON CORPORATION CO., LTD.
 YOUNGSHIN PRECISION CO., LTD.
 MIJUAUTOTECH CO., LTD.
 KWANGJIN SANGGONG CO., LTD.
 NINEONE CO., LTD.
 ONJIGU CO., LTD.
 BOGOSUN CO., LTD.
 INNOTECH CO., LTD.

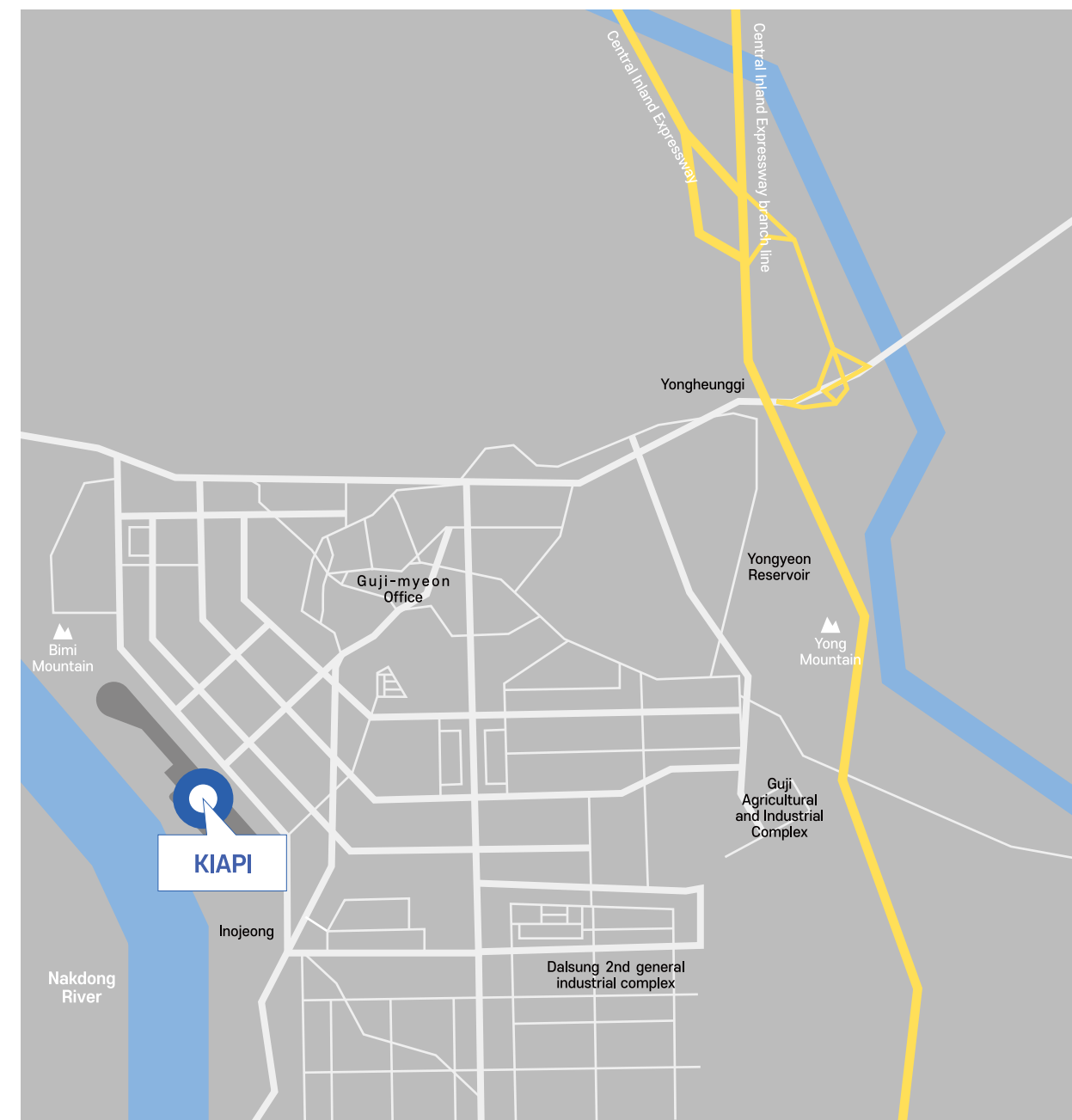
ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE
 DAEGU GYEONGBUK INSTITUTE OF SCIENCE & TECHNOLOGY

HYUNDAI MOTOR COMPANY
 KIA CORP
 HYUNDAI MOBIS
 NEXEN TIRE
 RENAULT KOREA MOTORS

09 / Way to come

Address

201, Gukgasandanse-ro, Guji-myeon, Dalseong-gun, Daegu



Using the highway

Hyeonpung IC (Guji direction) > Gukgasandanbuk-ro (2.29 km movement) > Turn left toward the national industrial complex > Gukgasandan-daero (After moving 1.75m and turn right) > Gukgasandan-daero 39-gil (After moving 743m, turn left) > Gukgasandanse-ro 40-gil (667m movement) > Entrance of Daegu proving ground (After passing the main gate, go straight for 500m, and then the main building and parking lot)