



Machinery / Equipment / Vehicle Monitoring
by using IoT technology



TEKFEN CONSTRUCTION



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ABOUT TEKFN CONSTRUCTION

Tekfen Construction, a leading corporation in challenging fields of contracting but also a studious environmentalist, traces its roots to an engineering consulting company established in 1956 in Turkey.

An affiliate of Tekfen Holding, Tekfen Construction is a respectable name in the international contracting arena with over 300 projects successfully completed in Turkey, the Middle East, North Africa, Caucasia & Central Asia, and East & Central Europe. Its wide span of activities range from heavy civil works to refineries and petrochemical plants; from satellite towns to large industrial processing plants; from pipelines and marine structures to power plants, electrical and communication works.

With its sister companies in engineering and steel manufacturing as well as strategic partnerships, Tekfen is a dynamic and sought-after EPC contractor, specialising in oil&gas, pipeline, infrastructure and civil works.

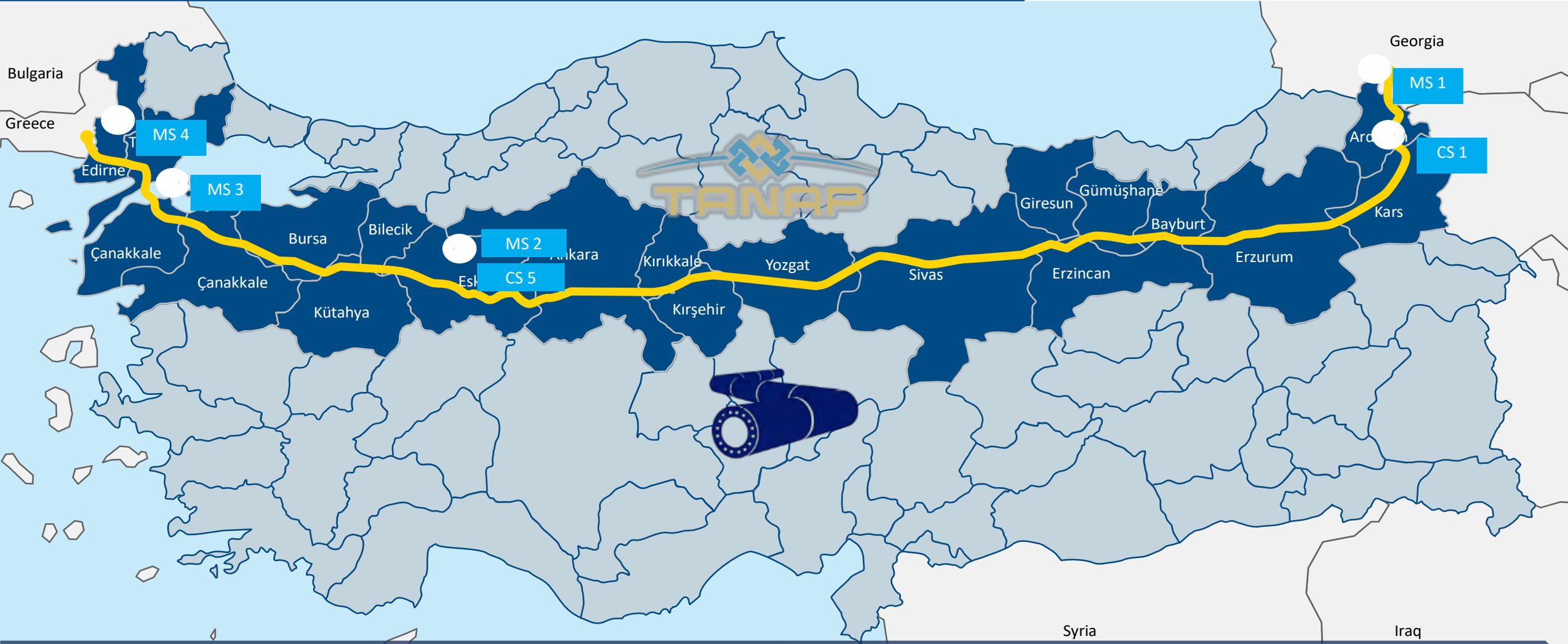
As an ISO 9001, ISO 14001 and OHSAS 18001 certified company, Tekfen is dedicated to the highest quality standards and aiming excellence through «continuous improvement».

Tekfen Construction is a large family of 20,000 employees, including subcontractors' personnel.



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TANAP COMPRESSOR & METERING STATION PROJECT



The TANAP (Trans Anatolian Natural Gas Pipeline Project) starts from the Georgian-Turkish border where it connects to the South Caucasus Pipeline (SCP) and ends at the Turkish - Greek border, where it feeds into the Trans Adriatic Pipeline (TAP). There are 2 compressor stations and 4 metering stations on the 1,850 km pipeline.

TEKFEN 4.0 IoT

There are 5 different construction areas (Metering Stations and Compressor Stations) along the 1850 km TANAP Pipeline.

The Project Management is located in the city of Eskişehir and situated almost at the middle of the pipeline route.

Facing difficulties in managing distant locations, TEKFEN developed an IoT system to increase the control over machinery/equipment/vehicles and reduce the risks involved.



During peak, a total of 300 vehicles and 105 heavy equipment, 450 drivers and 135 heavy equipment operators worked on the project at different locations.

Maintenance and Journey Management teams managed the control of machinery/equipment as well as vehicles, by using conventional methods, such as spreadsheets, assignment of additional personnel, travel along the pipeline for visual control, etc. However, due to distant locations, Maintenance and Journey Management teams failed in many cases to achieve full control.

TEKFEN Management implemented **a step change programme** by introducing new technologies aiming to control machinery/equipment/vehicles and personnel.

TEKFEN Management allocated **a team and a USD 3 million fund for the programme** to search for new technologies to answer TEKFEEN's needs.



TEKFEN 4.0 IoT

TEKFEN developed its own 4.0 IoT system internally, as no adequate match was readily available in the industry. The system configured for the needs reported by site teams, devices are purchased and installed on the machinery/equipment/vehicles (3,045 devices for 1st phase, 2,600 more will be fitted until end of 2019).

TEKFEN 4.0 IoT System;

- Enables the use of one software for Journey Management in all projects.
- Prevents unauthorized use of machinery/equipment/vehicles.
- Monitors periodic maintenance of all equipment.
- Monitors the entry/exit to/from pre-defined geofenced area.
- Monitors the movements on pre-defined route.



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TEKFEN 4.0 IoT includes IVMS (In Vehicle Monitor System) module, developed to use in every project worldwide.

- Inhouse developed program as per the TEKFEN Projects needs.
- Monitors standard figures such as location, driving hours, speed, accelerations, etc.
- Monitors standard figures such as location, driving hours, speed, accelerations, etc. Additionally TEKFEN 4.0 IoT system monitors the compliance to Company Driving Policies, such as 15 min rest in every 2 hours, etc.



TEKFEN 4.0 IoT

TEKFEN 4.0 IoT aims to use the same software for IVMS and Journey Management in all its projects.

- Prevents different software interfaces,
- Users will be familiar with software in future projects,
- Keeps records of vehicles and drivers for future projects, as the programmes use same database.



TEKFEN 4.0 IoT

TEKFEN 4.0 IoT aims to prevent unauthorized use of machinery/equipment/vehicle

- Operators and drivers are issued an electronic ID badge after completion of required trainings and evaluations.
- Electronic ID badges contain RF devices which can be read by electronic devices from a distance.
- Vehicles are set for work if the authorized electronic ID badge is located on the driver's seat.
- Should an unauthorized person attempt to drive, the vehicle gives alarm, but still allows driving for possible emergency reasons.



TEKFEN 4.0 IoT aims to monitor periodic maintenance of all equipment,

- The system monitors each machinery/equipment/vehicles in every TEKFEN Project worldwide.
- The Maintenance Team uses the software to monitor the location of each machinery/equipment/vehicle and the next maintenance time for the equipment.
- No vehicles will be forgotten, nor will maintenance be skipped as they are controlled by the software.
- The carbon emission of the equipment will be reduced.

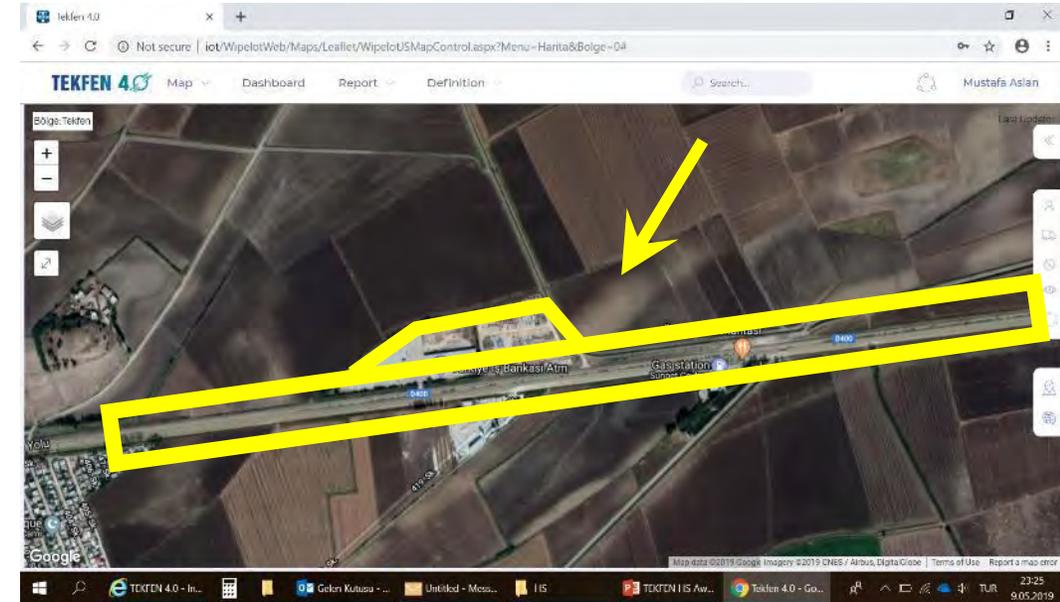


TEKFEN 4.0 IoT aims to monitor the entry/exit to/from pre-defined geo-fence area.

Any specified area such as pipeline corridor or any construction area can be defined as geo-fenced area on the TEKFEN 4.0 IoT system.

The system monitors the machinery/equipment/vehicles entry/exit to/from those areas and ensures that the machinery/equipment/vehicles are in the authorized zone.

When a vehicle leaves the pre-defined pipeline corridor, or any other specified area, the system alerts the related personnel to prevent man-loss especially in desert areas.

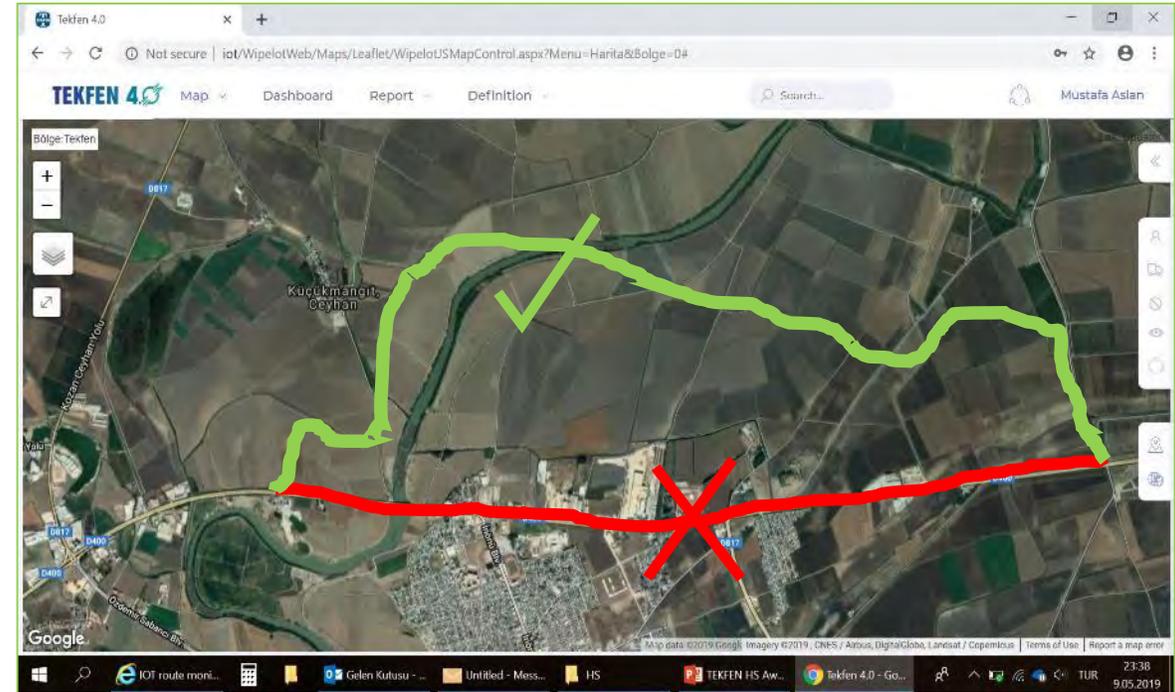


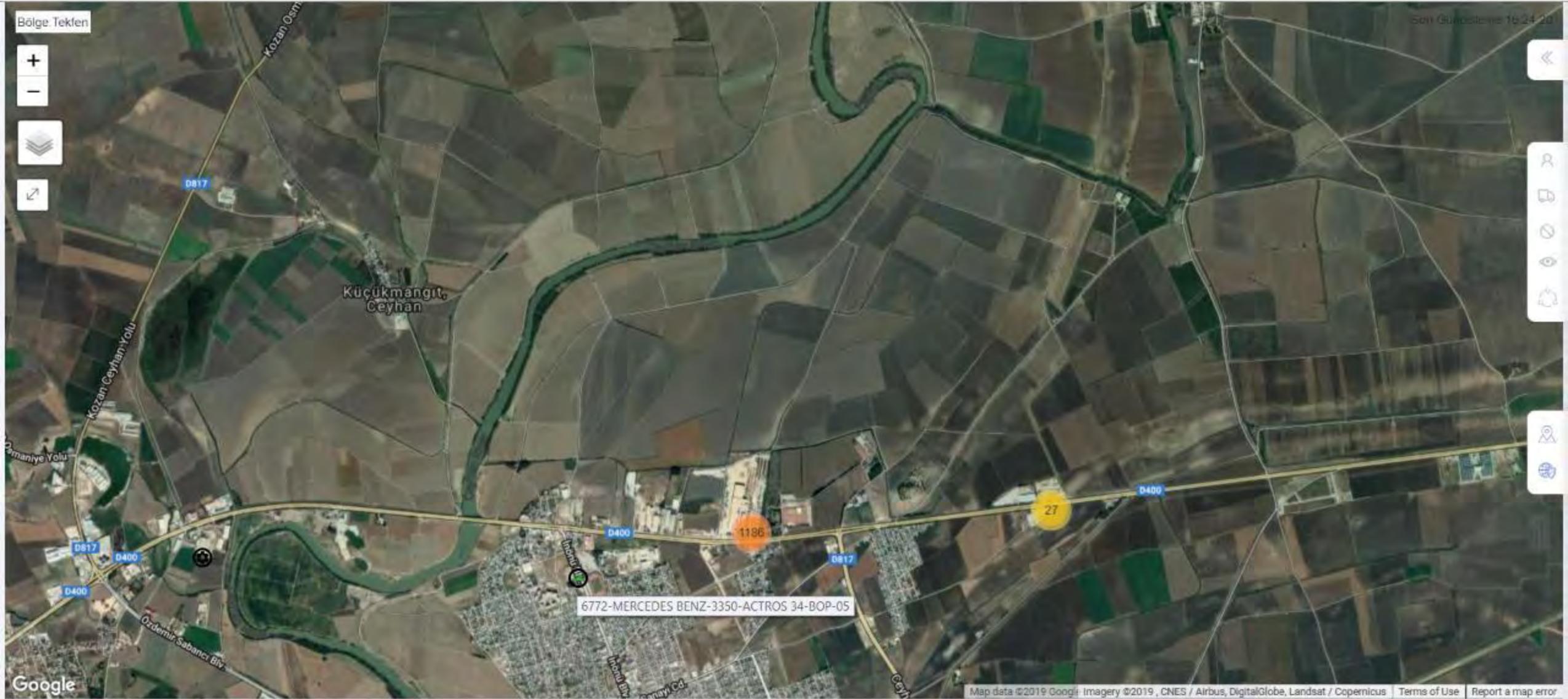
TEKFEN 4.0 IoT aims to monitor the movements on pre-defined route.

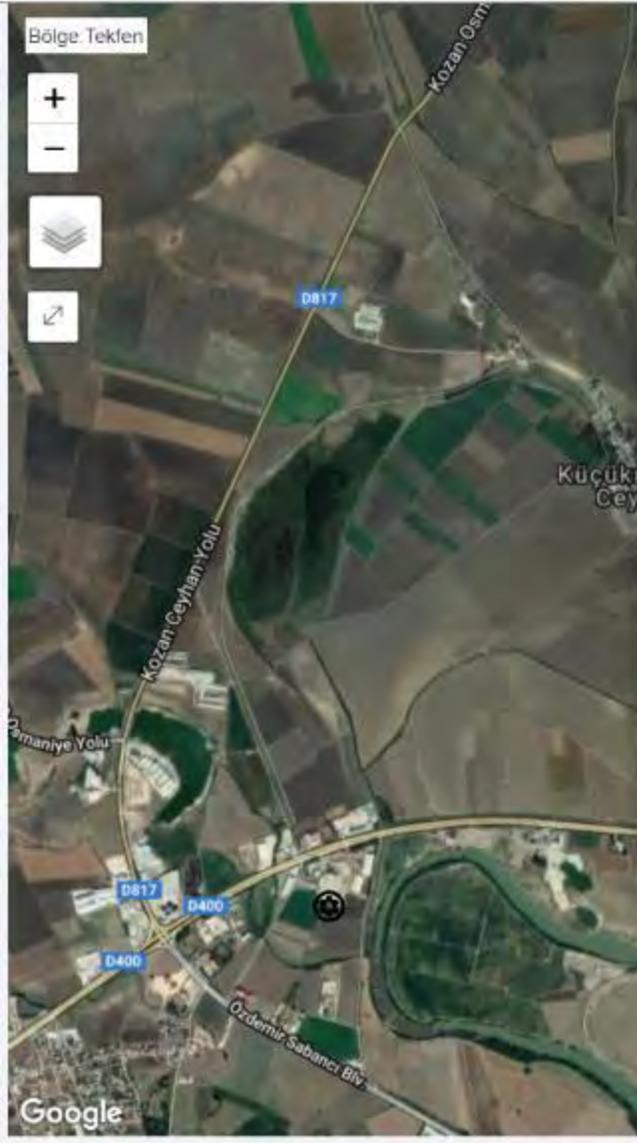
Any specified route can be defined as access route and the TEKFEN 4.0 IoT system monitors the machinery / equipment / vehicles movements on pre-defined routes, to ensure that they use the allowed routes.

In critical areas, safe access routes are defined in the system and specified vehicles/equipment use pre-defined access road, checked by related personnel. Risk analysis is performed and use of that road is agreed with Client and/or local authorities.

This function mainly is used for the routes for surplus transportation and concrete mixers, that may increase the traffic risk of local residents.









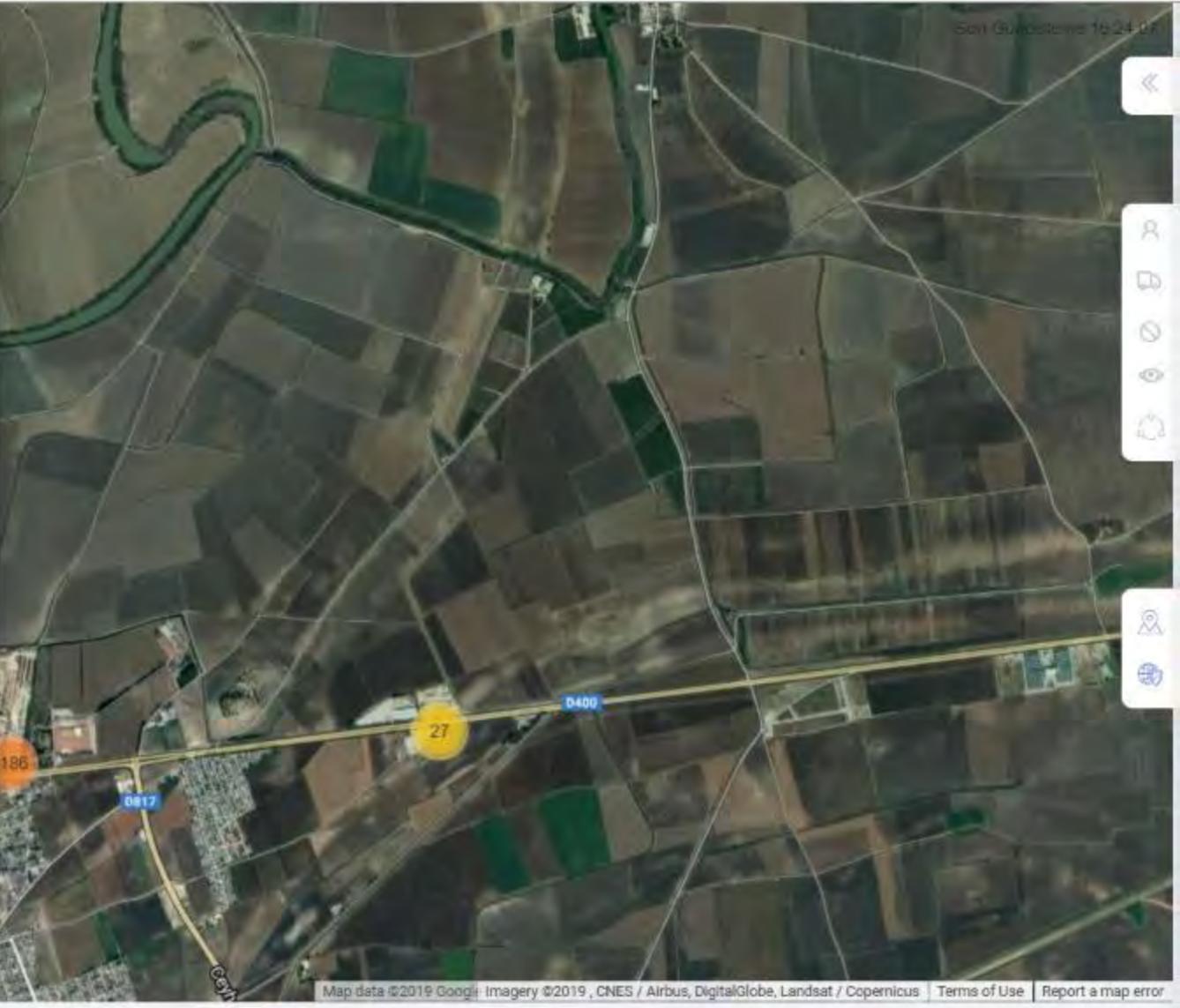
07.05.2019 15:24:56

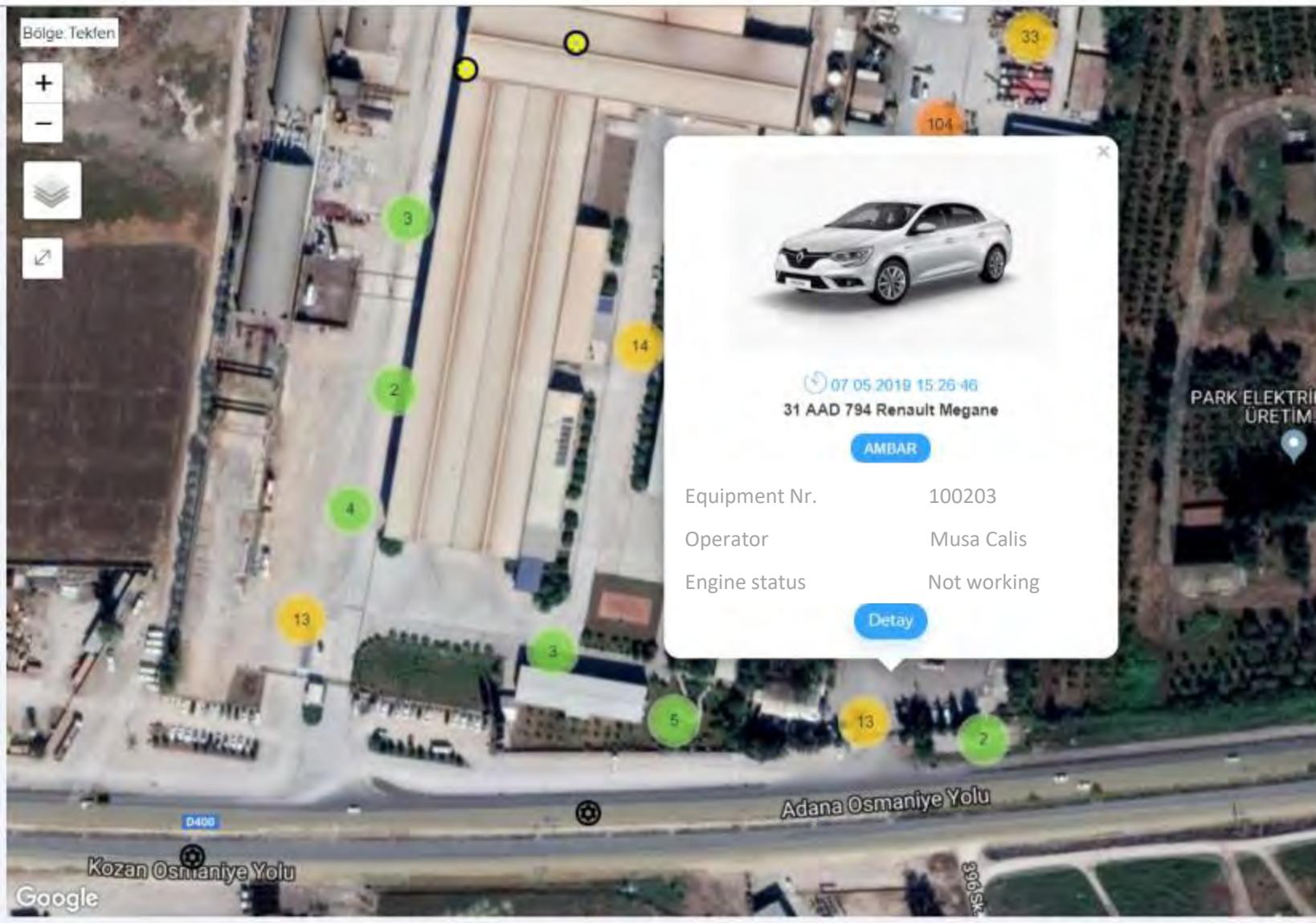
6772-MERCEDES BENZ-3350-ACTROS 34-BOP-05

Ekipmanlar

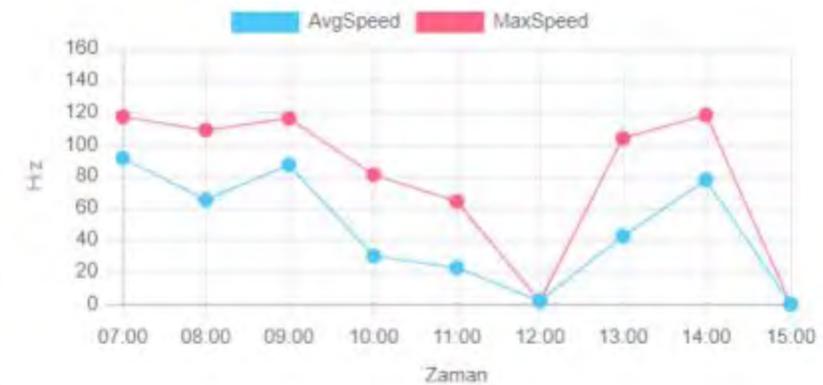
- Equipment Nr. 2320
- IMEI Code 00901-6772
- Engine Status Çalışıyor
- Operator BULENT KOCA
- Main Category Çekici
- Sub-Category Genel
- Project 00501-CEYHAN GAT

Detay

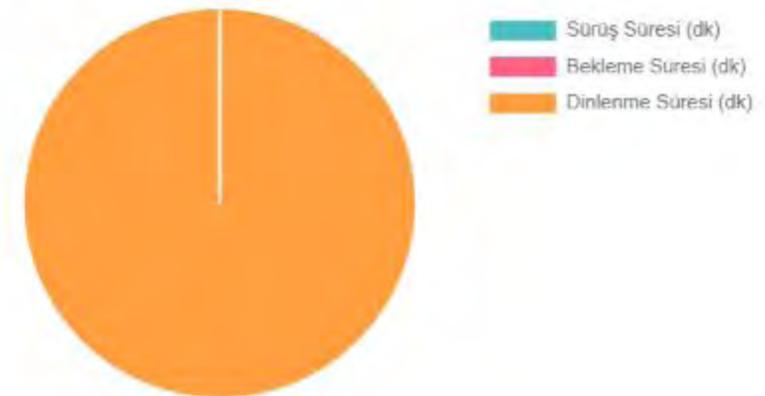




Speed / time graph for today



Engine working periods





Alarm Pannel

Label	Alarms	Date	Area
31-AAD-573	Ani Hızlanma Alarmı	07/05/2019 16:10:00	Tekfen Kapat
31-AAD-573	Ani Hızlanma Alarmı	07/05/2019 16:10:00	Tekfen Kapat
31-YR-454	Ani Yavaşlama Alarmı	07/05/2019 15:53:27	Tekfen Kapat
31-YR-454	Ani Yavaşlama Alarmı	07/05/2019 15:53:27	Tekfen Kapat
31-AAD-794	Ani Hızlanma Alarmı	07/05/2019 14:04:10	Tekfen Kapat
31-AAD-794	Ani Hızlanma Alarmı	07/05/2019 14:04:10	Tekfen Kapat
25-AAN-617	Ani Hızlanma Alarmı	07/05/2019 14:01:47	Tekfen Kapat
25-AAN-617	Ani Hızlanma Alarmı	07/05/2019 14:01:47	Tekfen Kapat
MUSTAFA ONTEMEL	Düşme Alarmı	07/05/2019 13:24:23	Tekfen Kapat
31-AAD-798	Ani Hızlanma Alarmı	07/05/2019 10:15:14	Tekfen Kapat



0

Speed Violation

↑ 28

Acceleration

↓ 25

Decelerations

0

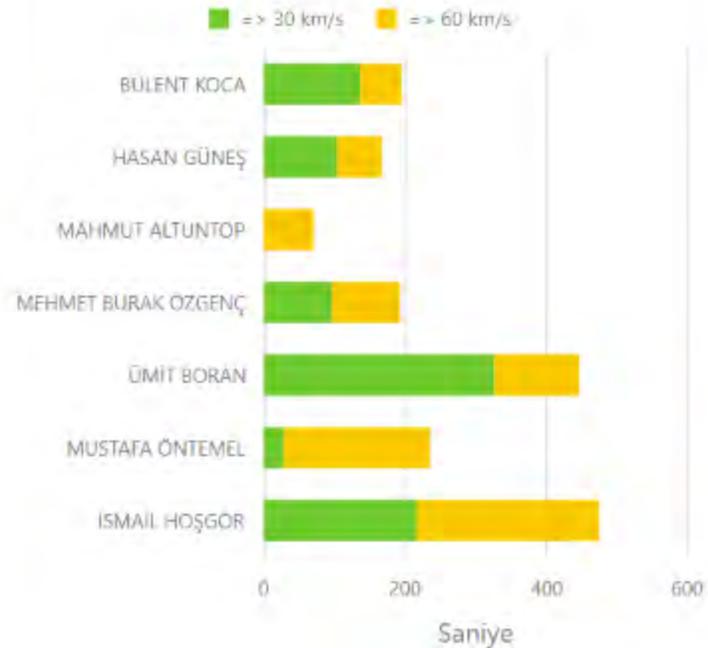
Unauthorised use

0

Total distance violation



Speed Violations Periods



Speed Violations List

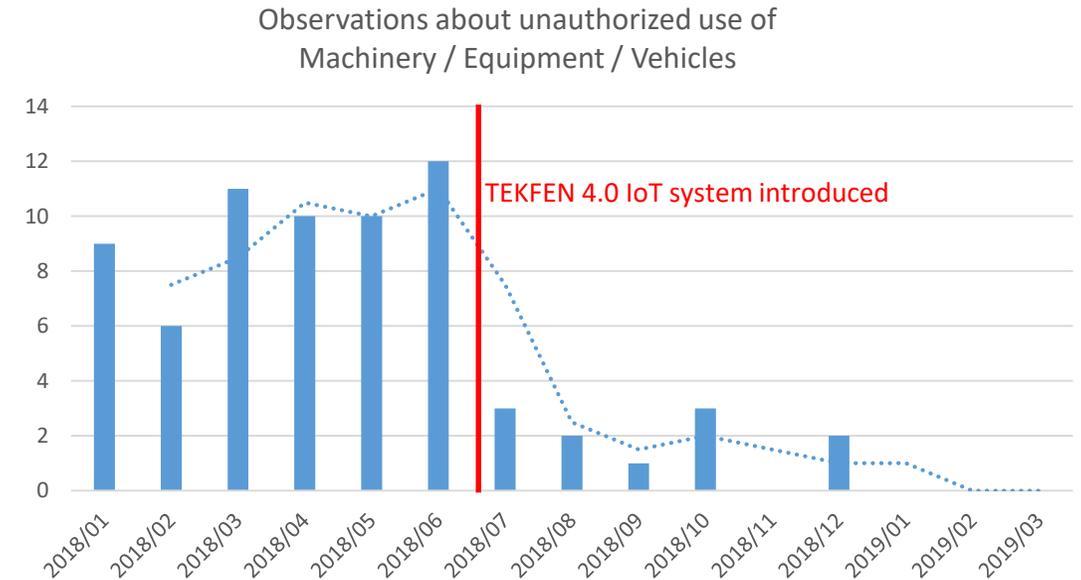
Sürücü Adı	Araç Adı	Tarih	Sürüş Hızı	Hız Sınırı	Adres
ABDÜLKADİR KAPAN	102988-FORD-TRA...	24.4.2019 13:23:19	93	70	D-400, 01920, Koruklu, Ceyhan, Türkiye
ABDÜLKADİR KAPAN	102988-FORD-TRA...	24.4.2019 13:19:08	85	50	D-400, 01920, Koruklu, Ceyhan, Türkiye
TUFAN AYKUT KOÇ	1000932-RENAULT-...	24.4.2019 13:10:11	48	30	İnönü Bulvarı, 01920, Altıocak, Ceyhan, Türkiye
TUFAN AYKUT KOÇ	1000932-RENAULT-...	24.4.2019 12:24:38	95	50	D-400, 01920, Koruklu, Ceyhan, Türkiye
ABDÜLKADİR KAPAN	31 AAD 794 Renaul...	24.4.2019 11:41:08	94	50	D-400, 01920, Koruklu, Ceyhan, Türkiye
MAHMUT ALTUNT...	102988-FORD-TRA...	24.4.2019 11:03:15	83	70	D-400, 01922, İncetarla, Ceyhan, Türkiye
MAHMUT ALTUNT...	102988-FORD-TRA...	24.4.2019 11:01:30	89	70	D-400, 01922, İncetarla, Ceyhan, Türkiye
MAHMUT ALTUNT...	102988-FORD-TRA...	24.4.2019 10:58:40	87	70	D-400, 01920, Koruklu, Ceyhan, Türkiye
İBRAHİM ERCAN A...	102988-FORD-TRA...	19.4.2019 17:34:28	70	50	D-400, 01920, Koruklu, Ceyhan, Türkiye
HÜSEYİN SİMİTÇİ	102988-FORD-TRA...	18.4.2019 17:35:09	77	50	D-400, 01920, Koruklu, Ceyhan, Türkiye

After use of TEK FEN 4.0 IoT system, the performance is measured as below;

The observation reports about unsafe use of machinery/equipment/vehicles were dramatically reduced, as the devices give alarm in any violation of regulation.

During the pilot project, a total of 58 observations were recorded about unauthorized usage of machinery/equipment/vehicles in 6 months prior to implementing the TEK FEN 4.0 IoT.

After the installation of the devices and implementation of the TEK FEN 4.0 IoT system in the same project, similar observations in the next 6 months were down to 11.



TEKFEN 4.0 IoT system also aimed to;

- Reduce the travels of Maintenance Teams to check the general condition and maintenance requirements of the machinery/equipment/vehicles at distant locations.
- Reduce carbon emission by reducing travel of Maintenance Teams.
- Increase the efficiency of machinery/equipment usage.
- Reduce incidents, as machinery/equipment/vehicles are kept under control and prevent work with overdue maintenance of the machinery/equipment/vehicles.
- Find the location of forgotten or stolen machinery/equipment/vehicles, as they are fitted with tracking devices.

