MONITORING PLUS

MONITORING OF PUBLIC SERVICE SPECIAL VEHICLES

SKIF

MODE OF OPERATION, OPPORTUNITIES AND EFFECT

The mobile monitoring terminal installed at the monitoring site receives geolocation signals from the satellite (GPS / GLONASS) using a GPS receiver.

The mobile terminal equipped with a GSM / GPRS receiver transmits data about the location and the readings of the sensors installed on the vehicle to the server via a GSM-Data channel (GSM-SMS, GPRS). Access to the monitoring system server is performed via the Internet.

- FULL CONTROL OF THE DRIVERS WORK, STRICT OBSERVANCE OF ROUTE SCHEDULE
- DETECTION AND PREVENTION OF VARIOUS VIOLATIONS AND IMPROPRIETIES, TRACKING FOR TECHNICAL SERVICEABILITY OF VARIOUS NODES AND COMPONENTS OF TRANSPORT AND SPECIAL VEHICLES
- CONTROL OF CARGO TRANSPORTATION AND STORAGE CONDITIONS (TEMPERATURE REGIME, ETC.)
- SUPPORT OF CONTINUOUS COMMUNICATION BETWEEN THE DRIVER AND THE CONTROLLER (OPERATOR)
- OPPORTUNITY FOR OPERATIONAL AND STRATEGIC PLANNING OF TRANSPORT WORK
- INCREASE OF EFFICIENCY OF ITS USE
- REDUCTION OF EXPENSES ON FUEL AND LUBRICANT MATERIALS
- REINFORCEMENT OF WORKPLACE DISCIPLINE OF THE PERSONNEL
- REDUCTION OF THE MAINTENANCE EXPENSES
- TRANSPORTATION SAFETY
- PREVENTION OF EMERGENCY SITUATIONS;
- INCREASE OF QUALITY OF SERVICES;
- PREVENTION OF VEHICLE THEFT;
- AND MUCH MORE

The satellite monitoring system for transport and control of fuel consumption allows to reveal and prevent cases of fuel dumping by drivers and the subsequent driving up the numbers of the kilometers travelled.

As a result, with the same work load of the vehicle fleet, fuel consumption is significantly reduced. In some cases, fuel economy makes the highest rate of return of the monitoring system.

Reduction of the average monthly kilometers travelled by vehicles is achieved by optimizing transport management, routes, reducing downtime of vehicles with idle engine running.

The vehicle monitoring system allows operators to track the vehicle's position in real time regime, to see the average speed, parking time and places, loading and off-loading of the vehicles, the place and time of work of additional equipment and component units, the change in the index of axle load sensors of the vehicle.

As a result, the operator can more efficiently manage the vehicle fleet, for example by optimizing the traffic routes, directing the closest to the work site vehicles to perform the tasks, also the operator can monitor the start / finish time and duration of the sweeping, watering, chemical spreading, vacuum cleaning operations, the vehicle aerial switch-on and much more.

Improving the productivity and work discipline of drivers allows to identify and encourage the most effective employees and vice versa, to take disciplinary measures against those who let the vehicle downtime, perform unauthorized routes or do fuel dumping. This helps to increase the vehicle service life, to reduce expenses on the vehicle repairs and technical maintenance.

up to **30%**	up to **90%**	up to **35%**
Reduction of expenses on transport maintenance	Reduction of time spent on data collection and analysis	Decrease of expenses on maintenance and reduction of write-offs
Elimination of misuse of vehicles	**100%**	Increase of work efficiency of controllers (operators)
Reduction of vehicles downtime and increase of safety	Control, supervision and accounting	Reduction of expenses on fuel and lubricant

MONITORING OF SPECIAL VEHICLES
IN WINTER PERIOD

Public service utilities on SPECIAL VEHICLES arrive at a certain road and begin to clean the roadway from the snow placing it along the curbstone.

The vehicles, which are equipped with a front plow to collect the fallen snow from the roadway, are engaged in this process.

In the middle of the vehicle there is a horizontal brush for sweeping the roadway, the brush clears away the snow remaining after the plow's work.

There is a sprinkler or sprayer of dry or liquid anti-ice chemicals in the rear part of the vehicle.

It is possible to control the process of switching on / off and duration of the vehicle tools work and receive reports and various notifications about it.

THE PLOW DOWN/UP MOVEMENT

CHEMICALS OFF-LOAD ON/OFF

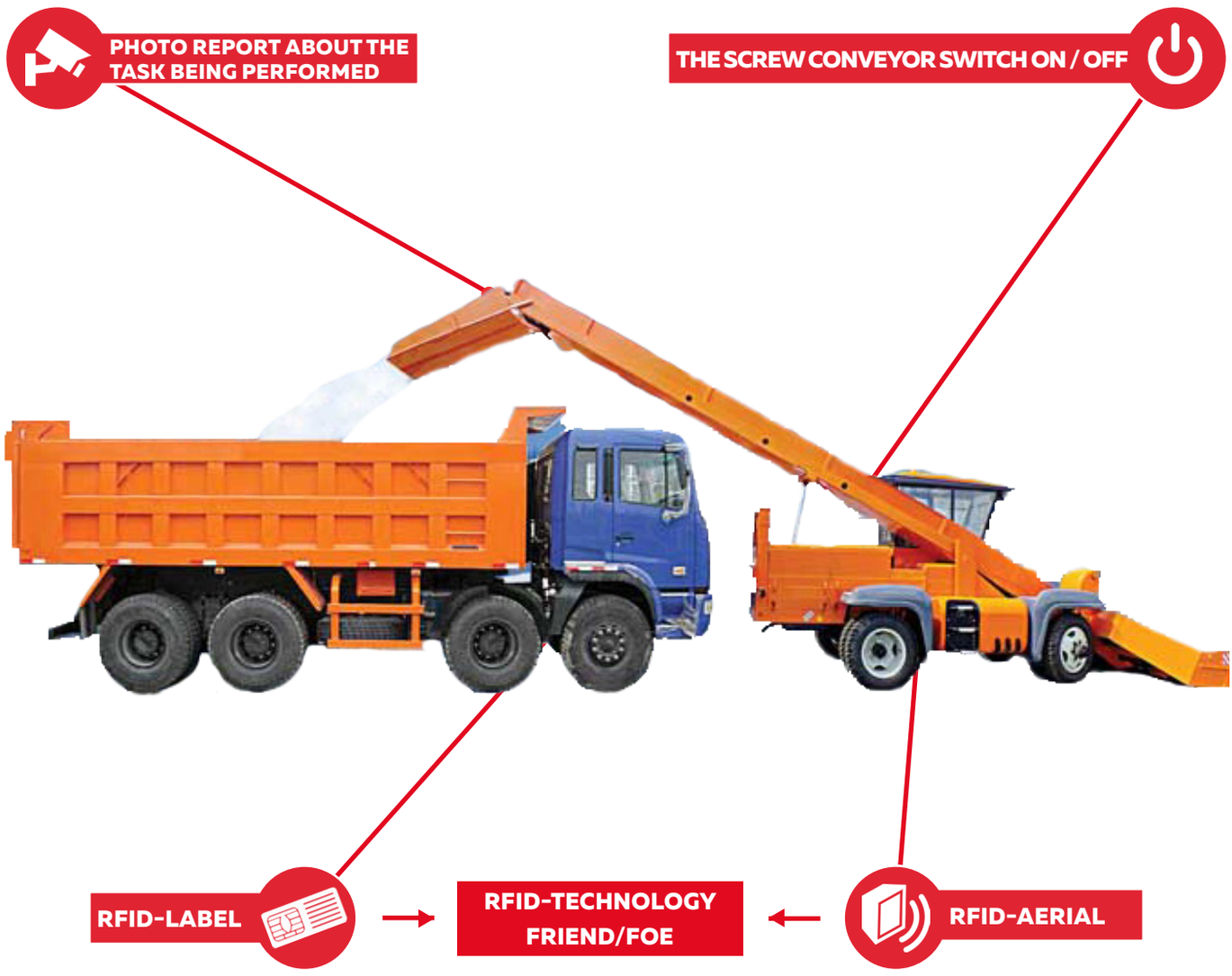
THE BRUSH ON / OFF

The formed snowballs, located along the curbstone of the roadway, are then loaded into SPECIAL VEHICLES commissioned to transport them away.

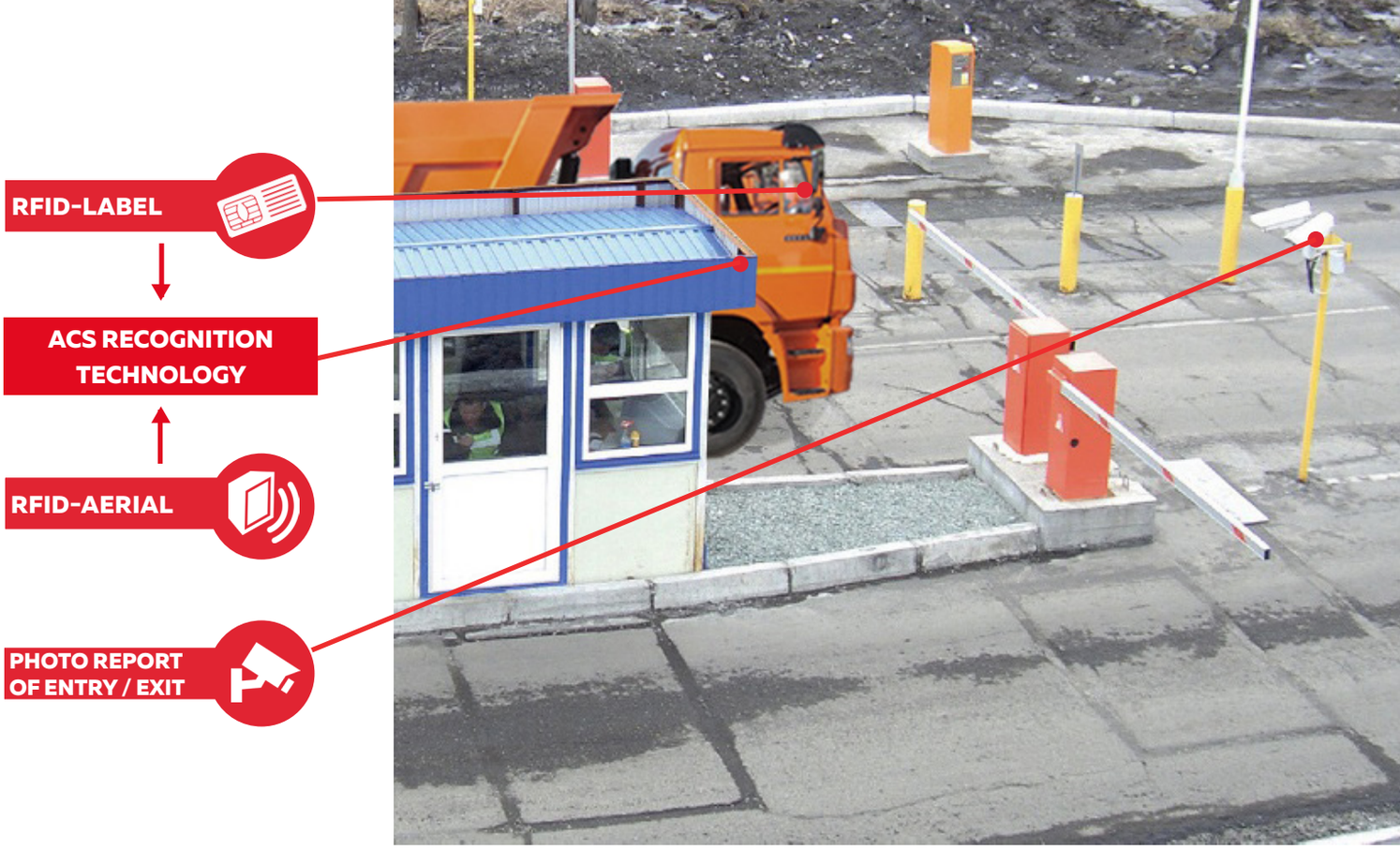
The autoloader vehicle arrives on the road which has been cleared from the snow and treated with anti-ice chemicals and gets a position near the curb stone where the snow balls are located, then the vehicle starts to move at the moment when the snow is sent for loading.

The truck drives up to the snow-removing vehicle, which is able to identify the approaching vehicles, and gets a position to receive the load of snow.

As soon as the driver receives the signal for the snow off-load permission, he puts the screw conveyor into motion and the camera (mounted on the loader vehicle body) produces a snapshot of the empty body of the arrived vehicle, later, after the snow has been loaded, the camera produces a second snapshot which shows the visual cubic volume of the snow in the vehicle body. The snow off-loading process continues when the next truck for snow loading arrives at the place and the process goes on until the task is finally complete.



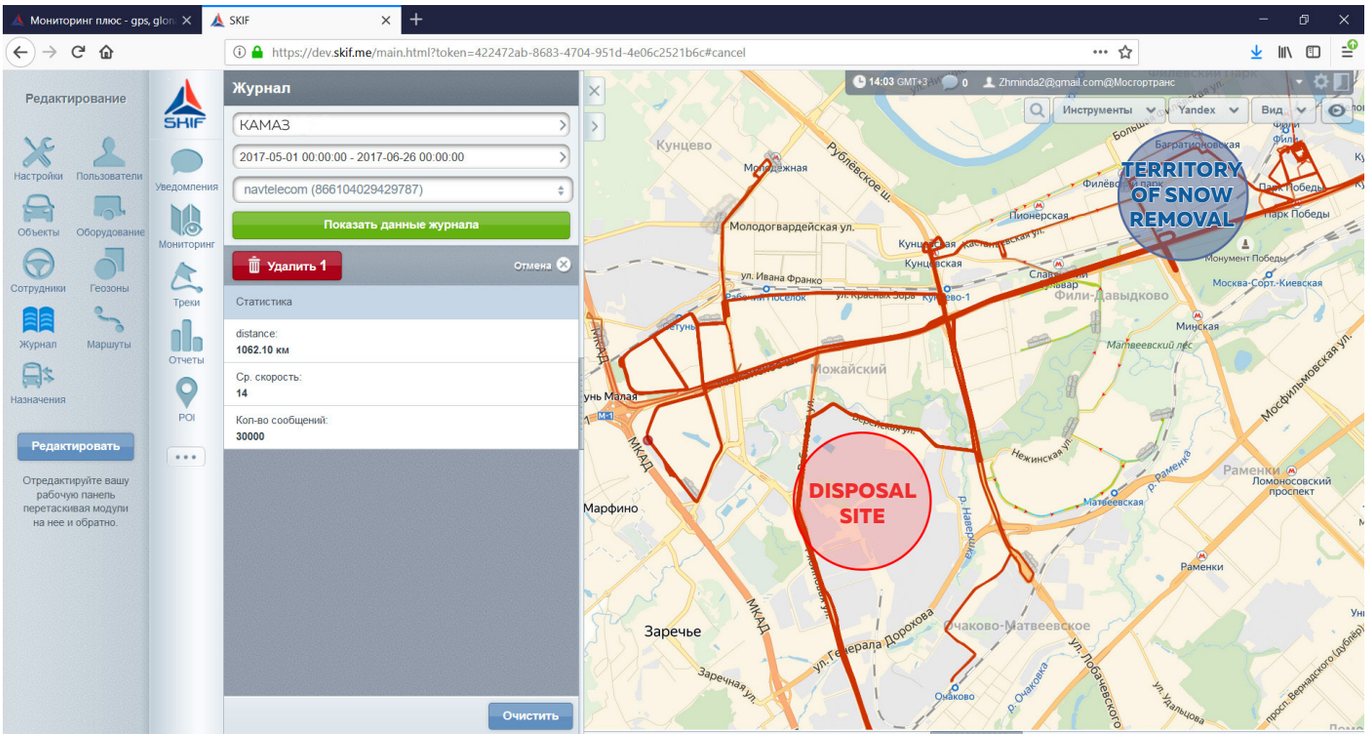
Clearing of formed snowballs and swept snow is also performed by snow-removing vehicles equipped with a screw conveyor (a working rotating tool). The vehicles move away snow packs and perform their direct discharge at a remote from the roadway distance.



Snow-loaded trucks head to the approved disposal site or snow melting facility that have been introduced into the Skif.me software.

Besides monitoring visits of the given Geozone by SPECIAL VEHICLES and receiving reports and notifications, there is also a possibility to set up AMCS (Access Monitoring Control System) using RFID technology (the method of automatic object identification) that makes it possible to identify objects and authorize their entry to a closed or controlled territory.

While monitoring the snow removal and disposal process, you don't only control the coordination of actions but also you get a full and detailed report on the incurred costs and expenses, and the most important thing is that you will see the actual amount of snow that has been cleared and removed.



- FULL CONTROL OF THE DRIVERS' WORK, STRICT OBSERVANCE OF ROUTE SCHEDULE
- CONTROL OF QUANTITY OF ENGAGED SPECIAL VEHICLES
- REDUCTION OF EXPENSES ON FUEL AND PREVENTION OF VARIOUS VIOLATIONS AND IMPROPRIETIES (ELIMINATION OF UNAUTHORIZED ROUTES AND FALSE RECORDS IN TRIP SHEETS)
- CONTROL OF SNOW TRANSPORTATION FROM THE LOAD SITE TO THE OFF-LOAD SITE
- OBTAINING THE REPORT ON THE KILOMETRES TRAVELLED, FUEL CONSUMPTION AND THE CUBIC VOLUME OF THE TRANSPORTED SNOW;
- NOTICE ABOUT FAILED ARRIVAL AT THE APPOINTED SITE
- ELIMINATION OF A POSSIBILITY OF A STRANGE VEHICLE COMING UNDER THE SCREW CONVEYOR AND GETTING LOADED WITH SNOW
- CONFIRMING PHOTO REPORTS FOR EACH FACT OF SNOW LOADING AND ITS VOLUME, AND ALSO FOR ENTRY / EXIT OF DISPOSAL SITE TERRITORY

MONITORING OF SPECIAL VEHICLES IN SUMMER PERIOD

Street watering and washing vehicles are designed for washing and moistening hard road coatings, protecting them from overheating in the hot season, as well as for air cleaning and improving the micro-climate of the air near the transport routes. They can be tow-type (drawn be a wheel tractor) or self-propelled (on the chassis of a standard truck or on the chassis adapted to the specific purpose of the vehicle).

The street watering and washing vehicle is equipped with a water tank mounted on a trailer, semitrailer or self-propelled chassis, and a sucking water pipe connecting the tank with the centrifugal pump, which pumps water through the distributive pressure water conduit to the two washing nozzles.

It is more effective to wash roads in rainy weather. Washing roads is like doing laundry, the same approach works best: pre-soaking helps house-wives to handle even the dirtiest spots.

Washing roads in rainy weather is much more economical than in dry sunny weather. Dust must be wetted before it is washed away.

During the rain, the dust, which has gotten in between the asphalt particles, becomes wet, and therefore it is easier to wash it away. By doing so we use water sparingly. The street sprinkler has to only direct a strong stream of water at the slushy dust. As a result, roads become cleaner quicker. Rain can only lay the dust while the street sprinkler washes and cleans it away from the streets.

Also in the rain the roads get dirty with ground soil coming from the tyres of the cars parked on verges. This mud from the car tyres also streams down on the sidewalks and roads from verges that are located above the curbstone.

So if these mud flows are not washed away from the roads immediately, then all this mud will dry up and turn into dust. Later it is more difficult to clear it away because the dust penetrates into the asphalt coating and starts to damage it.

When it rains in the city, the dust becomes slushy and the roads become slippery. And if it is not washed away, not cleared away by sprinkled water, then it turns into a muddy mess.

Sometimes the sprinkled water stream is visibly not strong enough but it can be explained by the fact that the street sprinkler has run out of water.

In this case, the sprinklers go to get a necessary supply of water and then the water pressure is again at its norm. In the summer season when the weather is hot, street watering is used simply to cool the roadway and protect it from early wear.

Street sweepers are used for cleaning solid coatings of transport infrastructure facilities. The operational work of the street sweeper consists of sweeping the surface, collecting the dust into the storage container, transporting it to the waste burial site and emptying the storage container there. Then the operation cycle is repeated.

The sweeper's main working tool is a brush. The most common brushes are cylindrical brushes with a horizontal axis of rotation and the pile placed on a cylindrical surface and end-type brushes with an axis steeply inclined to the original ground and the pile placed on the bottom end. There are also cone-shaped brushes, which are less commonly used; their apex angle of a cone can be up to 60° with the pile placed on the conical surface, and strip brushes having the pile on the outer side of the chain enveloping the idler wheel and the driving sprocket.

Street vacuum sweeping vehicles «V-Sweepers» are used to clean streets in large cities from dust, small debris, stones commonly found on the roadway and load all this stuff into the receiver hopper.

Sweeping is performed by a central brush, one or two side-mount channel brushes, and, if available, an additional brush placed on the controllable console in front.

In summer period measures to maintain the roadside verge include: clearing of dust and debris, mowing weeds and cutting down bushes. Chemicals can be also used in addition to mowing to eliminate weeds from the roadside verge. Placement of vegetation plantations on roadside verges is not allowed.

Grass used for fortifying the roadside verge should be cut at least once a month in the spring-autumn period.

The roadside verge is a part of the road directly adjacent to the roadway and levelled with it; it is designed to protect the asphalted edge of the roadway from destruction, to ensure traffic safety, and also to be used for pedestrian traffic.

Urban green plantations (trees and bushes) with their green leafage (branches and leaves) impede the clear view of traffic management facilities and limit the visibility of the road conditions for drivers, some of the leafage can partially hang over the roadway and correspondingly over the trolleybus wires thus posing a direct danger to road traffic safety.

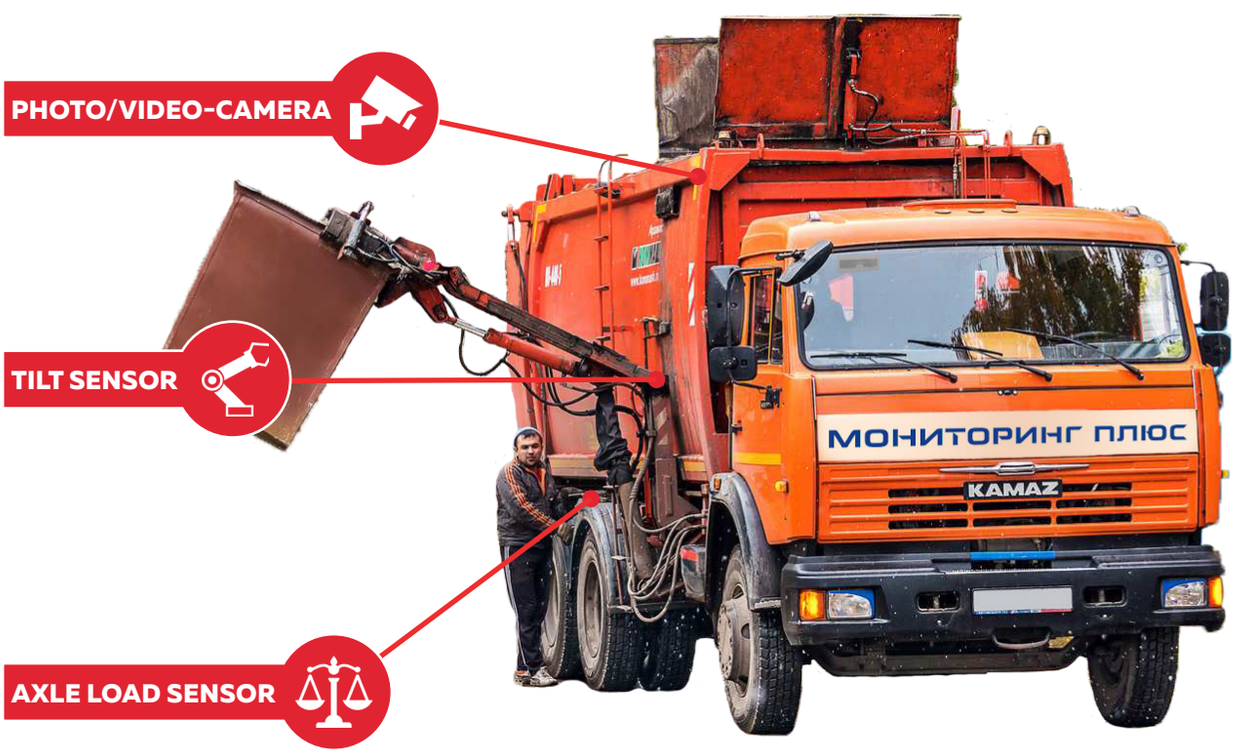
To ensure greater and better visibility, as well as to enable daylight penetration onto the roadway since daylight is the best means of natural light for drivers, and also to maintain the aesthetic appearance of the city, public service utilities take regular measures to eliminate the spots of greenery overgrowth.

MONITORING OF SPECIAL VEHICLES DURING DISPOSAL OF SOLID WASTE

When fulfilling their contract obligations for the collection and disposal of solid waste, public service utilities engage their specialized vehicle fleet and perform field-trip activities according to a scheduled plan of tasks.

In the course of collecting solid waste from the scheduled places, the load weight of the waste collector vehicle will naturally increase, so the data of the axle load can be read and received in the SKIF software by installing additional pressure sensors into the vehicle's suspension so they could measure the bellows pressure or pneumatic circuit pressure of the vehicle and transmit data in the analog signal format to the telematic terminal. Or a displacement sensor can be installed to measure the axle load and the load weight on vehicles with a spring suspension.

However, it is better to use CAN-LOG for truck transport to optimize the installation of systems that control parameters of vehicles equipped with the CAN digital bus, because it enables to get readings of the required information.



RFID-technology equipment enables to identify the vehicles authorized to enter and dispose solid waste at the disposal site when they get into the identification zone of the RFID-aerial which works in the UHF frequency range designed for stable work both in short-distance field and long-distance field up to 16 meters. The aerials are adapted to the Russian climate and are optimized to work with the UHF frequencies alloted for use in the Russian Federation.

Each time the garbage container is lifted and its contents are emptied into the vehicle's garbage tank, SKIF software will receive notification from a measuring device that provides continuous monitoring of the situation of the inclination angle change in relation to the horizontal axis.

Moreover, every time the tilt sensor gives a signal, this moment will be snapshot by a packaged photo camera with infrared LED, which is installed on the garbage truck body.

SPECIFICATION
SKIF.ME

- Software has been developed on the basis of Java and the JavaScript programming language, using the PostgreSQL DBMS, which has powerful and reliable tools for transactions, replication and processing of GEO data. Availability of simple and open JSON API allows quick and easy integration with any external accounting and control systems.

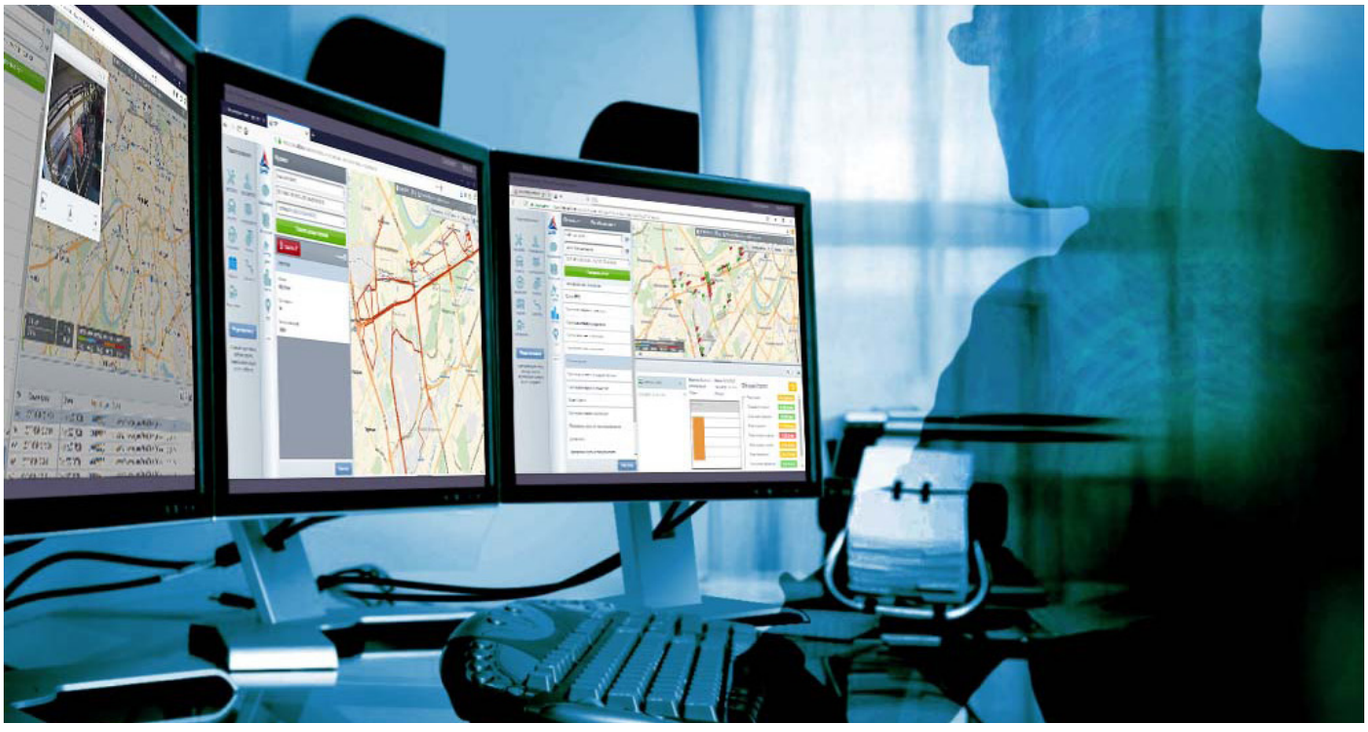
- Monthly backup, update of server software by the Supplier's specialists;

- Individual adjustment of the system to the specifics of the enterprise: drawing of special working areas of the Customer on the map (vehicle depots, work sites, etc.), control of the operation of the executive vehicles, control of fuel consumption, refueling and dumping;

- Holding training courses for the Customer's specialists, issuing certificates confirming the training;

- The possibility to create analytical reports and graphs of various indexes recorded in the satellite monitoring system. Reports are generated on the basis of editable templates which can consist of the required number of graphs and tables with data for any period of time. Reports can be formatted for printing and exported to PDF, Excel, or CSV.



- The possibility to quickly receive notifications of any events detected by the system (pressing the alarm button, exceeding speed, exiting the allowed geozone, changes in the indexes of the sensors, changing of the driver, operation work of additional equipment, etc.). There should be an option available for the controller to configure the notification display in a pop-up window, as well as a possibility to send notifications by e-mail or via SMS.

- The possibility to create tasks (occasional or scheduled) that perform certain pre-planned actions. The task, for example, can specify the creation and regular (on the basis of the graph) dispatch of the report to the e-mail

- A possibility to record information about the drivers (name, phone, photo), assign them to work on various vehicles, and also receive reports with information about which driver was at wheel in a certain reporting period.

- A possibility of work with an optional interface of the satellite monitoring system for transport, designed to work with mobile phones based on Android and iOS. The application can provide information on the operation of the vehicle's main sensors, give an opportunity to view tracks for specific periods, display information on notifications and send querying for reports at specified intervals.

- There is an opportunity for third-party programs to connect to the database of the transport monitoring system and receive telematic information for further processing in external applications, including 1C-Enterprise program.

TERMINAL

It monitors the vehicle condition, controls its location, movement, fuel level and consumption, the status of the connected sensors and the reading of data from the on board network.

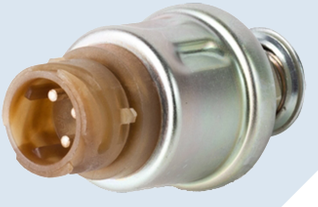
FUEL LEVEL SENSOR

Designed to determine the level of fuel in the vehicle tank. It is used in the monitoring systems and is directly connected to the terminal, which collects, stores and transmits information about fuel level and temperature measured by the sensor.

WATER LEVEL SENSOR

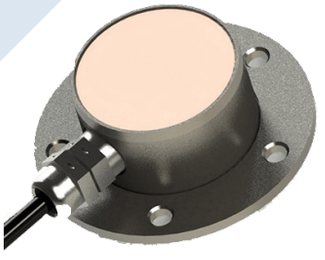
Designed for high-precision measurement of the water level in the vehicle's tanks and tanks with an allowable height and further data transfer via the telematic terminal.

AXLE LOAD SENSOR



It is used on the vehicles equipped with a pneumatic and spring suspension to determine the axle load and the weight load in the transport telematic systems. The sensor is integrated into the vehicle monitoring system and provides data in the analog signal format.

TILT SENSOR



Provides continuous monitoring of the three axes to check for changes in the angle of inclination in relation to the horizontal axis. Depending on the selected operating mode, the tilt sensor allows the information about the change of the inclination angle of the monitored vehicle to be transmitted in the form of a digital or analog signal.

PHOTO CAMERA

Packaged photo camera with infrared LED is designed for: surveillance, control and monitoring. It enables instant downloading and transfer of images from local control and monitoring centers to the central control unit.

PTT SWITCH

(GSM connection between the driver and the controller)

It is designed to provide voice communication between the controller and the driver of the vehicle equipped with the monitoring system terminal.

RFID-READER

It is used to execute tasks where a small and medium reading distance is required. Depending on the type of label, the subsystem uses short-distance or long-distance identification.

RFID-AERIAL

It works in the UHF frequency range designed for stable work both in short-distance field and long-distance field up to 16 meters. The aerials are adapted to the cold climate and are optimized for working with the UHF frequencies. The aerial has a circular polarization enabling it to get the signal from the labels at any position.

RFID-CARD

They are used for non-contact identification of people and vehicles and in local payment systems, in access systems. There are two types of identification: long-distance (up to 16 m) and short-distance (up to 10 cm). A high degree of protection of recoding and reading operations is provided.

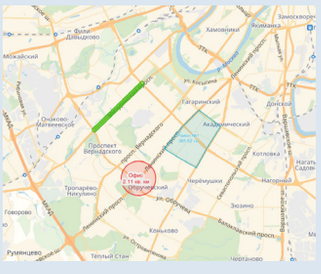
RFID-LABEL

It is designed for non-contact identification of vehicles. There are two variants of RFID-label: the first one is stuck to the vehicle windshield, the second one is put on moving and non-moving objects. They are used to organize the system of vehicle registration, automation of the checkpoints of parking spaces, city yards, cottage settlements.

ACS

Access monitoring and control system is a complex of software and hardware technical security tools that perform access control in a given territory as well as working time control. Main performance mode: RFID-card, RFID-label.

GEOZONE



Geozone is an area on the map that has a certain purpose. It is designed for monitoring the movement of objects in these areas. Geozone can be presented as a polyline, polygon or a circle. This technology which is available in the SKIF software, excludes the installation of additional equipment of access monitoring and control system and site visit notifications.

DRIVING STYLE

Evaluation of the driving quality is based on a system of demerit points given for a certain period of time. The lower the point, the higher the driving quality. Demerit points are issued for each trip, then summed and averaged depending on time or distance. Demerit points are issued for violations based on five criteria: acceleration, braking, speeding, turning, unreasonable.

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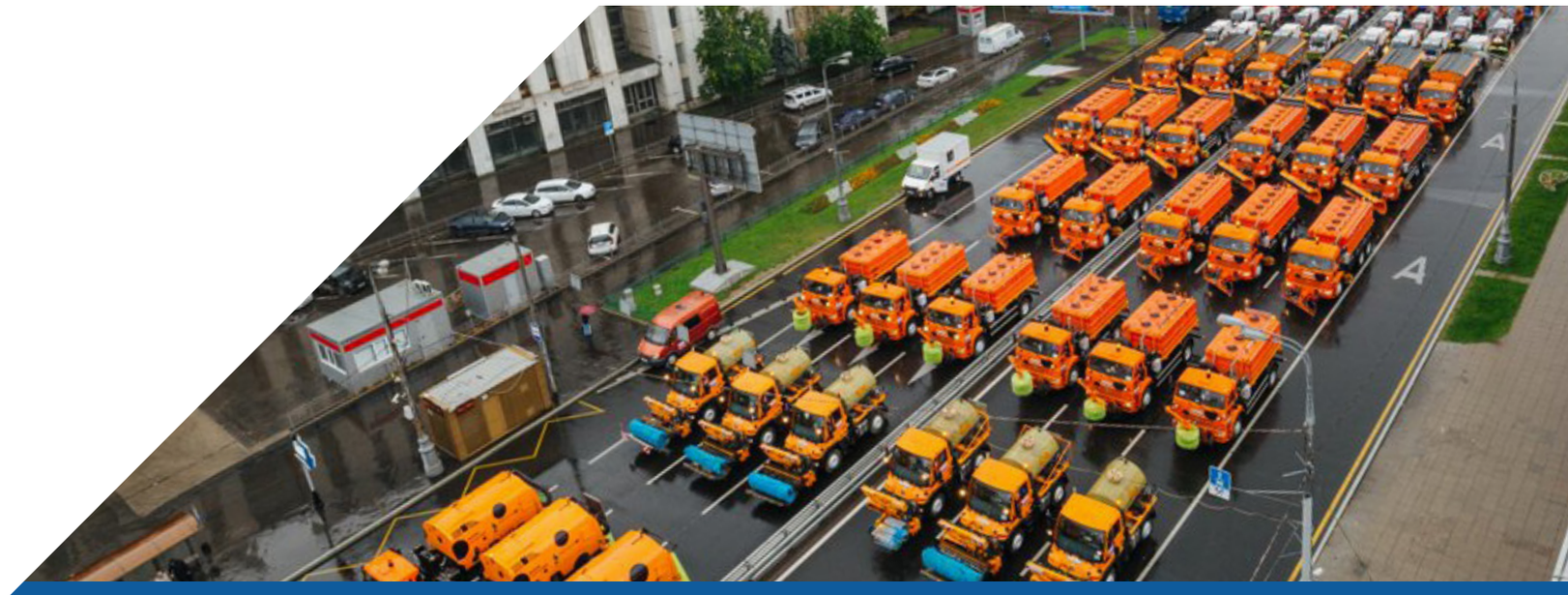

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