ELTE GPS SYSTEMS FOR RAILWAY INDUSTRY
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Succeeding always makes me happy. But achieving success for which we have worked long and persistently doubles my joy and satisfaction, because it makes me believe that the time devoted to it and the involvement of my employees have not been in vain.

We also owe our success to our clients. Their high requirements have resulted in making the product of the highest quality—SMOK Vehicle Monitoring System.

Kind regards,

Paweł Nosal
Prezes
For many years Elte SP z o.o. has been a leader and forerunner in production and implementation of systems for vehicle monitoring and fleet management based on GPS/GSM/GPRS technologies.

Our original product, SMOK Vehicle Monitoring System, is a powerful system which combines the state-of-the-art solutions in software and technology. Not only do these technologies provide ongoing monitoring of the fleet, but they also allow for effective management of company vehicles, which will in turn optimize your resources and reduce your costs.

As the manufacturer of all the components of the SMOK system, we guarantee we are able to tailor our solutions to your individual needs. The SMOK system consists of modules which allow for almost any configuration and upgrade, depending on your needs and requirements.

The highest level of customer service, guaranteed quality of components and professional warranty and post-warranty service has been appreciated by our numerous customers.

Please take a closer look at what we can offer.
WE ARE WHEREVER YOU ARE
INSTALLATION, SERVICE AND IT SUPPORT CENTERS

Bydgoszcz
Poznań
Zielona Góra
Lubin
Wrocław
Łódź
Warszawa
Pasłęk
Gdynia

IT service point
Installation and service shops
Mobile installation and service points
Calibration of railway tachographs

Last update on: 21.03.2016 r.
EXAMPLES OF IMPLEMENTATION OF THE SMOK SYSTEM IN RAILWAY COMPANIES

SELECTED COMPANIES FROM THE RAILWAY INDUSTRY WHICH BENEFIT FROM THE SMOK SYSTEM

- Enea Elektrownia Kozienice
- Euronaf Trzebinia
- Euroterminal Sławków
- ISD Huta Częstochowa
- Koleje Mazowieckie
- Kolprem
- Lotos Kolej
- Lubelski Węgiel BOGDANKA
- PGE Elektrownia Turów
- PKP Cargo
- PKP Cargo Service
- PKP Intercity
- PKP LHS
- Rail Polska

Last update on: 21.03.2016 г.
INTEGRATED TECHNOLOGY

WIDE RANGE OF CAPABILITIES OF THE SMOK MODULE

We have created the SMOK Vehicle Monitoring System to meet all your expectations. From the simplest ones, related to the monitoring of the location of rail vehicles to technologically advanced systems, which meet high requirements of our clients.
CAPABILITIES OF THE SMOK MODULE
Distinctive features of our device among this type of recorders are as follows:

- **reduction of operating costs** (e.g. getting rid of paper tape),
- **facilitation of archiving** (data are recorded automatically as server les),
- **instant access to data** (selection of the date and number of the locomotive in the application).

Retrieving of data does not require any action from the driver, whereas the data analysis can be done almost anytime.

A tachograph chart
The tachograph is also equipped with the GPS module which allows to precisely determine the location and time of an incident.

For our tachograph the Polish Office of Rail Transport has issued a certificate of admission to exploitation for unlimited duration.
The operation of the tachograph with the SHP database is possible without purchasing and maintaining of expensive trackside infrastructure.

This solution makes it possible to cut expenditure on traction vehicle equipment, to reduce costs of trackside infrastructure, and to increase safety of railway traffic.

Our tachograph may be extended by SHP module with a constant memory that can store information such as points and driving directions in which you wish to activate the SHP feature. The SHP feature is triggered at the desired places, using the information about the current position of the train.

Block diagram of the installation of tachograph with SHP function in the locomotive
In such configuration, the tachographs are mounted in locomotives operated by PKP LHS. For our tachograph with SHP feature the Polish Office of Rail Transport has issued a certificate of admission to exploitation for unlimited duration. This solution is patent pending.
This solution consists of an odometer with a positioning feature - a device mounted on the wagon axis - and software which allows you to read the recorded data and generate reports.

The odometer is complete with:

- its own power supply, to ensure continuous operation even for a few years,
- GSM module for remote reading of the current mileage of the wagon,
- GPS module to determine the current position.

Installation of the odometer does not require any structural changes in the wagon structure.

The above solution is used for example by Lubelski Wegiel “BOGDANKA” S.A.

This component has been developed by our company, and its industrial design is protected.

On-line reading of the mileage of railway wagons with visualization of their location on a digital map.
The user of the module accesses data by software installed on a computer or via a dedicated Web application. The wagon location and mileage may be viewed on various maps, including railway maps (to specify the location of the wagon in a particular section of track or station) and road maps (depicting the stationing of wagons in the road network).

This solution allows you to generate reports based on information from a specific time period (day, week, month, year) with regard to a specific wagon, wagon group, train composition or section, or a selected type of wagon (coal wagon, covered wagon, atbed, etc.).

Sample report on the course of wagons for the year 2014, the report contains two columns: individual wagon name and the distance in kilometres.
Positioning and SEPE integration modules installed in locomotives permit to transmit data about the train location to PKP PLK S.A. Data transmission is bi-directional. First the positioning system sends a query which contains the train number and the date of the planned course. The PLK system transmits information about the timetable and train, including time of departure, time of arrival, the initial station, and the destination station. Then the data such as train position, speed, direction, etc. are sent back on-line to the PLK system.

SEPE is a system which collects data about the operating load on railways, depending on the categories of trains which run within the infrastructure of PKP PLK S.A.
The system users may use a dedicated railway map showing railway lines with a layer of data containing the names of the stations. The system allows you to use any maps supporting WMS, TMS or another service, e.g., maps imported from Shape Le.

SMOK Net application contains features that enable you to export any point on a map to external map applications, such as Google Maps.
INTEGRATED TECHNOLOGY

POSITIONING MODULE

GPS controller is the key element of the SMOK system, which is mounted in the locomotive or coach. The controller records data about the location of railway vehicle, its speed, direction of movement, and data from sensors and interfaces. The collected information is sent to the server on a regular basis, and may be used to generate a variety of reports.

For our ET-GPS-GSM controller the Polish Office of Rail Transport has issued a certificate of admission to exploitation for unlimited duration.

The rolling stock can be tracked by a dedicated app which runs in any Web browser, and by a suite of programs (GPS Monitor and Rejestr GPS) which may be installed on your computer.

Animation and visualization feature of route tracking on a digital map - Rejestr GPS
Monitoring of vehicles is also possible via SMOK Mobile application which may be installed on mobile devices, such as a smartphone or tablet running with the following operating systems: iOS, Android and Windows Phone.
Sample report of the locomotive’s operation for a period of 1 week, and 3-shift work pattern. The report contains information such as:
- time when the engine was first turned on and last turned off during a shift,
- distance travelled (based on GPS),
- time of driving and stopping,
- operating and idling time,
- maximum temperature of the engine,
- maximum speed
- fuel consumption,
- average engine speed

SMOK Vehicle Monitoring System has been developed in close cooperation with our customers, also from the railway industry, so as to meet their needs, expectations and requirements of the market.

Today, the vast majority of newly produced rolling stock is fitted with the CAN bus, by means of which the manufacturers provide a series of operational data that may be read out and recorded in the SMOK system.
Sample report for two locomotives from the period of one week. The generated report is broken down into days of the week and includes data about:
- time when the locomotives began to operate,
- time when the locomotives stopped to operate,
- working time,
- operating time of the engine (engine hours),
- distance travelled,
- the amount of tanked and lost fuel,
- fuel consumption and average hourly fuel consumption

Name: Locomotive No. 001
Latest data: 06-10-14 15:49:01
Speed: 0 [km/h]
Power supply: ON
Fuel: 3976 [l]
Power: 0 [kW]
Distance pulses: 734,267 [imp]
Meter value: 7342 [km]
Engine speed: 400 rpm
Coolant temperature: 75°C
Implementation of the SMOK system means better fuel management. It enables fast and efficient compilation of data about fuel tanking and consumption with regard to a particular railway vehicle. In order to control the level of fuel in the tank we use a microprocessor probe, and to measure its actual consumption we use a set of ow meters.
The charts show changes in the level of fuel in locomotive tanks, and fuel consumption measured by a flow meter.

Fuel tank cross section showing how a digital chip fuel probe works.
The communication terminal is a device mounted in the locomotive cab which gives the driver access to the performance parameters of locomotives as registered by the system. The device also features bi-directional communication between the driver and dispatcher.

The fuel terminal is a device mounted by the fuel inlet which eliminates the need to use inaccurate measuring rods. This device permits the locomotive crew to read current amount of fuel in the tank as measured by the probe.
One of the ways to analyse the route of a railway vehicle is to record it as digital audiovisual material. The system allows for high quality recording of image and sound on digital storage media.

Distinctive features of our devices among the competitive products on the market are as follows:

- The recorded image is integrated with information about the location of the railway vehicle,
- The recorded audiovisual material is synced with the time of the vehicle’s electronic tachograph,
- Application replaying the picture does not require arduous searching through the footage frame-by-frame; by selecting the geographical location in the application, the user can play the recorded event (movies),
- Using a single application, you can analyze both the data registered by the tachograph and the audio-video material.

The audio-video recording system integrated with the tachograph is a solution which supports the processes of regular monitoring of safety and helps explain the reasons for the occurrence of incidents or accidents involving railway vehicles.
Efficiency in your hands

Driver Identification Module

Our module for the identification of drivers in the SMOK system allows to register the following details for each employee:

- working time in individual locomotives,
- working time during a specific shift,
- mileage travelled,
- the way the locomotive was used.

Depending on the applied solutions, the driver can be identified with a personal RFID card or Dallas chip.

Sample report for assessing the driver’s work in a specific locomotive. The report takes into account the shift pattern of work and contains information about:

- amount of fuel at the beginning of the shift,
- mileage travelled,
- engine working time,
- fuel consumption (as measured by fuel probes and an ow meter),
- idle time of locomotives exceeding 30 min.,
- the use of locomotive (operating time of the engine in relation to the shift time),
- the use of locomotive when operating under load.

The report also includes information permitting a very fast verification of incorrect operation as signalled by alarms:

- alarm L1 - no driver logged during the locomotive operation,
- alarm P1 - loss of fuel with a switched-off engine,
- alarm T1 - the critical temperature of coolant was exceeded,
- alarm T2 - the engine was turned off at too high a temperature,
- alarm V1 - the set speed was exceeded.
ELTE GPS Sp. z o.o.
Headquarters
ul. Medyczna 13
30-688 Kraków
tel.: +48 (12) 659 20 98
tel.: +48 (12) 658 02 94
tel.: +48 (12) 658 04 29
fax: +48 (12) 659 17 88
e-mail: biuro@eltegps.pl