TECHNOTON

ADVANCED MACHINERY TELEMATICS
PROJECTS

Our customer groups

- ✓ Telematics system providers;
- ✓ big machinery fleets;
- ✓ machinery manufacturers;
- ✓ machinery servicing companies;
- ✓ manufacturers of telematics equipment: GPS trackers, gateways, sensors;
- ✓ IoT equipment integrators.

Technoton equipment is installed in more than 140 countries on all continents

See cases on the website

Contents

Customer: Latvian Railroad track (part of Latvian Railways)

Task: fuel consumption monitoring

Machinery: track machines with diesel engines

Solution: DFM fuel flow meter and offline terminal

Result: 20 % fuel consumption economy on track machines, 10 % productivity improvement of machinery

CUSTOMER

Latvian Railways (Valsts akciju sabiedrība "Latvijas dzelzceļš") – is the national state railway company of Latvia. Company was founded in 1919 and reinstated in 1994. Company serves the railway network of the country.

2000+ km of railway lines

200+ diesel locomotives

40+ thousand tons of diesel fuel consumption per year

Railroad track (Latvijas dzelzceļš Ceļu distance) – is structural subdivision of the company. Subdivision's tasks are: permanent monitoring of condition of railway, railroad switches and engineering structures, assessment of their conformity with safety requirements and determination of train speed.

MACHINERY

The rolling stock consists of track handcars DKGY, track machines WM-15S12, shunting diesel locomotives TEM2, ballast distributing machines BDS-200, straightening machines Dynamic 09-3X and Duomatic 08-32, gravel planers USP 2005-SW and other machineries.

TASK

Track machines are equipped with diesel engines: JaMS 238, Deutz 6F, Deutz 6M, Deutz BF8M1015CP, Deutz TCD2015V8/1483, Deutz TCD 2015, Caterpillar 3412E. Engines power – 150...400 h.p., working volume – 6...14 L.

Machineries are used in difficult circumstances. It is common to solve urgent and responsible tasks related to safety of railway traffic, despite of the weather and time of day. Working day can be non-standardized.

Such operation mode increases fuel consumption significantly. Continuous operation in difficult circumstances also increases scope of maintenance work of machine components and aggregates. All this leads to operation costs increase and profitability reduction of company.

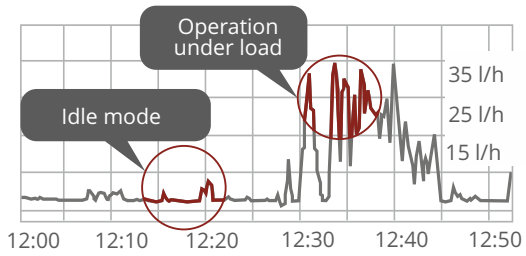
Latvijas dzelzceļš Ceļu distance decided to equip track machines with fuel consumption monitoring system. This system should provide fuel consumption and operation time monitoring in real time, as well as processing and visualization of received data.

SOLUTION

Fuel consumption monitoring system includes DFM fuel flow meters and offline terminal CKPT 31.

DFM fuel flow meters are mounted into fuel supply line and allow measuring actual fuel consumption. Each flow meter registers operation time of engine in various operation modes and also registers interferences into system.

DFM fuel flow meters solve the problem of fuel consumption and operating time monitoring (in different operation modes: idle, optimal, overload).



Fuel consumption monitoring in different modes

DFM fuel flow meter

CKPT 31 offline terminal unit registers data on fuel consumption and operation time in non-volatile memory. Monitored parameters are displayed on terminal, which is placed on board of track machine. Then information is sent to PC via Bluetooth. Specialized software allows to generate analytical reports on fuel and engine operating time in text or graphical form.

Ekaterina Mandryk-Kula, Technoton Baltic

"DFM fuel flow meter is reliable device for fuel consumption monitoring. Technoton produces wide range of flow meters for all kinds of vehicles. One-chamber (DFM 100AK, DFM 500AK) and differential fuel flow meters (DFM 250D, DFM 500D) were mounted on track machines, depending on engine specification and fuel consumption."

RESULT

For four months while DFM are in operation, fuel economy reached 20 %. Fuel consumption monitoring system, based on DFM fuel flow meters and CKPT 31 offline terminals showed high measurement accuracy and trouble-free operation.

Robust construction of DFM fuel flow meters ensures performance even in harsh environment. Flow meter is protected from unauthorized tampering and manipulations.

Analytical reports on fuel and engine operating time, generated from data received from offline terminal CKPT 31, allow top management to decide on the ways of increasing efficiency of machinery. During operation of fuel consumption monitoring system, performance of machines increased by 10 %.

Vladlen Maakedons, Latvijas dzelzceļš Ceļu distance

"Technoton products are ideally suited for railway equipment, which is used in harsh environment. Flow meters are highly reliability and show stable performance. In our opinion, and taking in account operation experience, fuel consumption monitoring system, based on DFM fuel flow meters and offline terminal CKPT 31 is the most reliable and accurate solution on the market. Latvijas dzelzceļš Ceļu distance is planning to install Technoton products on other track machines."

Customer: railway machinery manufacturing plant, Russia

Machinery: track machines

Task: fuel tank monitoring

Solution: DUT-E fuel level sensors, MasterCAN DAC converters

Result: installation of fuel tank monitoring system on track machines

CUSTOMER

The plant is one of the oldest machine-building enterprises in Russia. Main line is manufacturing of heavy track machinery and equipment for construction, renovation and maintenance of railway tracks. Equipment designed by company run on the railways of Russia and CIS countries.

700+ employees

152 years of successful work

2500+ track machines produced

MACHINERY

Three types of track machines were chosen for installation of fuel tank monitoring system.

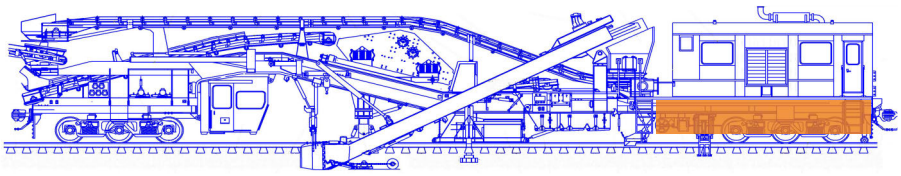
Track alignment, ballast section compacting and equalising machine
Two fuel tanks of 1200 L

Ballast Cleaning Machine
Two fuel tanks of 3200 L and one fuel tank of 1300 L

Snow Blowing Machine
Two fuel tanks of 1200 L

TASK

All track machines are equipped with several large-capacity fuel tanks - from 2400 to 7700 liters, depending on type of machine. Fuel tanks are of squared shape, low and elongated.



Fuel tanks on track machines are low and elongated (highlighted in orange)

Basic solution for railway machinery is fuel monitoring, based on standard float sensor and transmitting of analog signal to fuel indicator on dashboard. **However, float sensor measures fuel level with inaccuracy of a few centimeters. That means, indicator on dashboard do not display even draining of 200 - 300 l liters from fuel tank.**

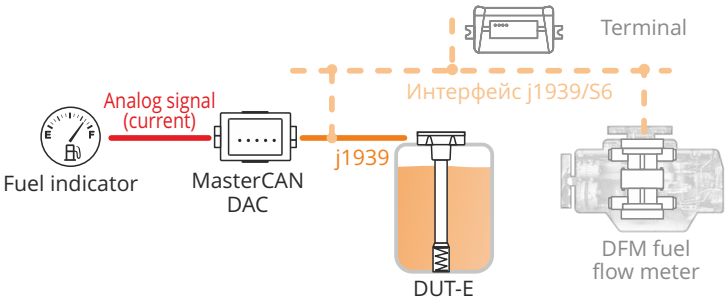
Our customer wanted fuel level sensors with high measurement accuracy. Fuel level in tank had to be measured with inaccuracy not more than ± 1%. Data on fuel volume had to be displayed on dashboard of track machine in the form of analog signal (current). In the long run, the system should be scalable with an option of connecting fuel flow meters – to measure current and travel consumption, and telematics unit – for online transmission of fuel data and parameters of machine operation to telematics service.

SOLUTION

In order to find an optimal solution to solve the task, the customer turned to Technoton-MSK company (Technoton's distributor). Technoton-MSK proposed fuel tank monitoring system based on DUT-E fuel level sensor, MasterCAN DAC 15 J1939 i/o module and S6 cabling system.

DUT-E fuel sensor with CAN interface measures fuel volume in fuel tank with high accuracy – measurement interval is 0,1 mm. Device converts fuel level value (mm) into volume (l). Calibration table is stored in the sensor's memory. Digital data (SPN) on fuel volume is transmitted via j1939 protocol to the input of MasterCAN DAC 15 J1939 i/o module.

DUT-E fuel level sensor and MasterCAN DAC J1939 i/o module



Fuel tank monitoring system and its scalability (dotted lines)

MasterCAN DAC 15 J1939 i/o module is an intelligent converter of digital and analog signals. MasterCAN DAC 15 converts digital data on fuel volume into a current signal with a value of 4 to 20 mA, which is transmitted to dashboard of track machine and displayed on fuel indicator.

Elements of S6 cabling system provide safe and reliable connection of DUT-E and MasterCAN DAC 15 to dashboard. Data is transmitted according to CAN j1939 standard. Functionality of fuel tank monitoring system can be quickly expanded upon customer's requests thanks to easy scaling of the system. At any moment additional connection of DFM fuel flow meters, telematics unit, CAN display and other devices could be made.

Vadim Shadursky, Head of Sales Department, Technoton-MSK

"Our customer had a necessity of displaying fuel level in tanks of track machines on dashboard with measurement inaccuracy not more than 1%. We offered telematics system, based on DUT-E fuel level sensor and MasterCAN DAC converter, connected via S6 Technology. The solution has proven to be optimal at price, easy to install and configure. Fuel tank monitoring system is easily scalable, so, in the long run, it is possible to connect telematics unit and DFM fuel flow meters with CAN interface. "

RESULT

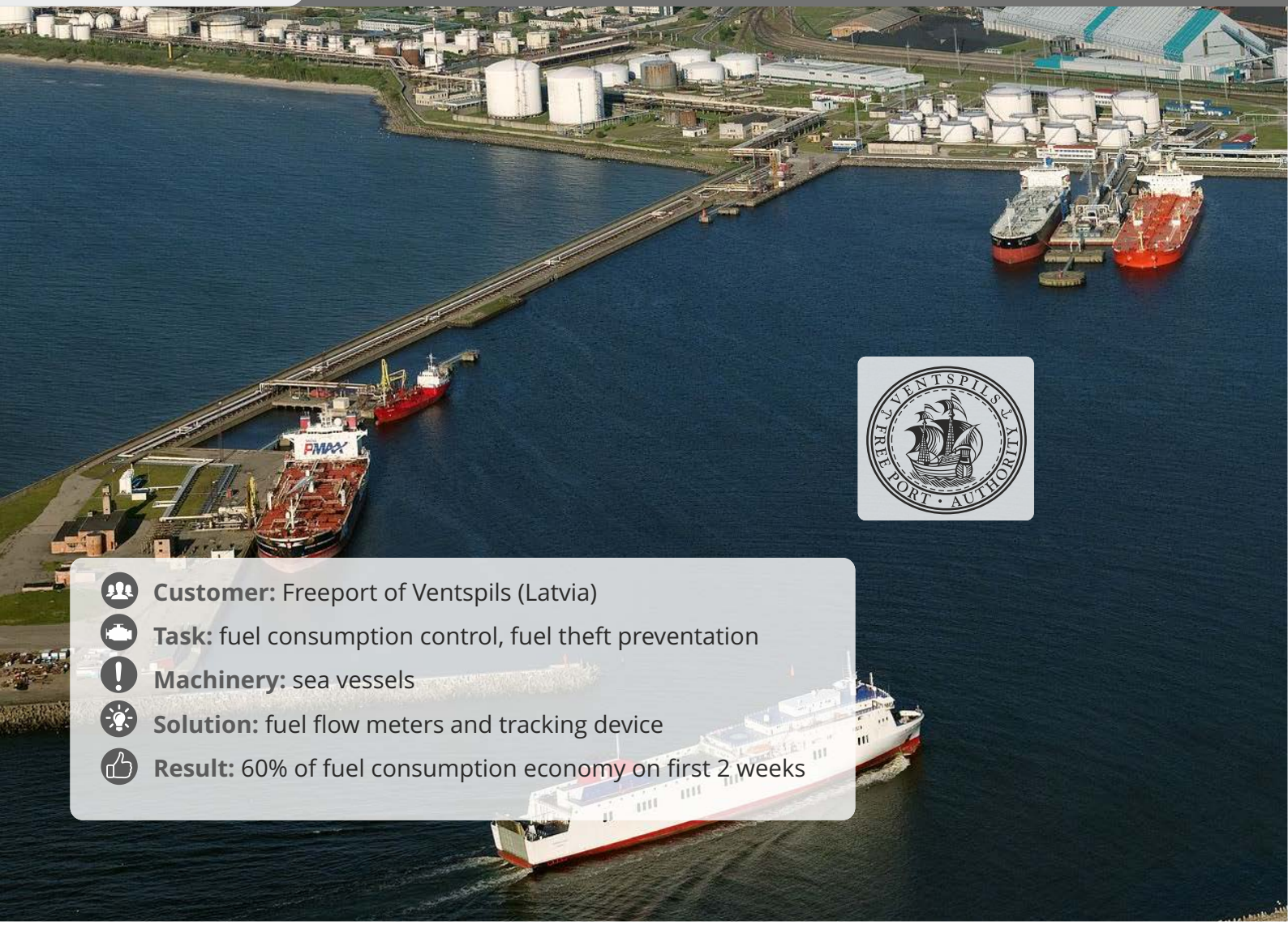
Fuel tank monitoring system, which consists of fuel level sensor, converter and cabling system by Technoton, has completely solved customer's task of monitoring fuel volume in fuel tanks of track machines. **DUT-E fuel level sensors and MasterCAN DAC converters are incorporated into design documentation on track machines.**

Now the company is going to install fuel tank monitoring system by Technoton on all track machines manufactured. Fuel level measurement system is quickly mounted, connected to onboard network of machine without using additional power sources. All elements of telematics system are easily configured from one point.

Leading specialist of customer company *

"In 2014, our company held a tender to select the best installer of fuel monitoring system for track machines. As a result, we signed a contract with Technoton-MSK for supply of Technoton sensors and converters. At the beginning of 2021, devices by Technoton were installed on more than 300 machines. Monitoring equipment had put its best foot forward, there had not been a single case of rejects. We recommend Technoton-MSK as a reliable supplier of high-quality Technoton products."

** Data is hidden from public access.*
Details on the project can be disclosed upon signing NDA and with the consent of «Technoton-MSK».



Customer: Freeport of Ventspils (Latvia)

Task: fuel consumption control, fuel theft preventation

Machinery: sea vessels

Solution: fuel flow meters and tracking device

Result: 60% of fuel consumption economy on first 2 weeks

CUSTOMER

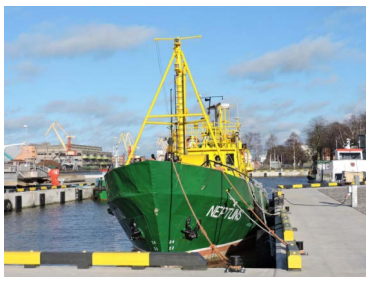
Freeport of Ventspils is a large transport hub and industrial center of international significance in Latvia and the Baltic Sea region. Advantages of ice-free deep-water port, diverse range of transport connections and logistics opportunities make the company accessible in the EU, CIS and towards the direction of Central Asia.

5 vessels processing at one time

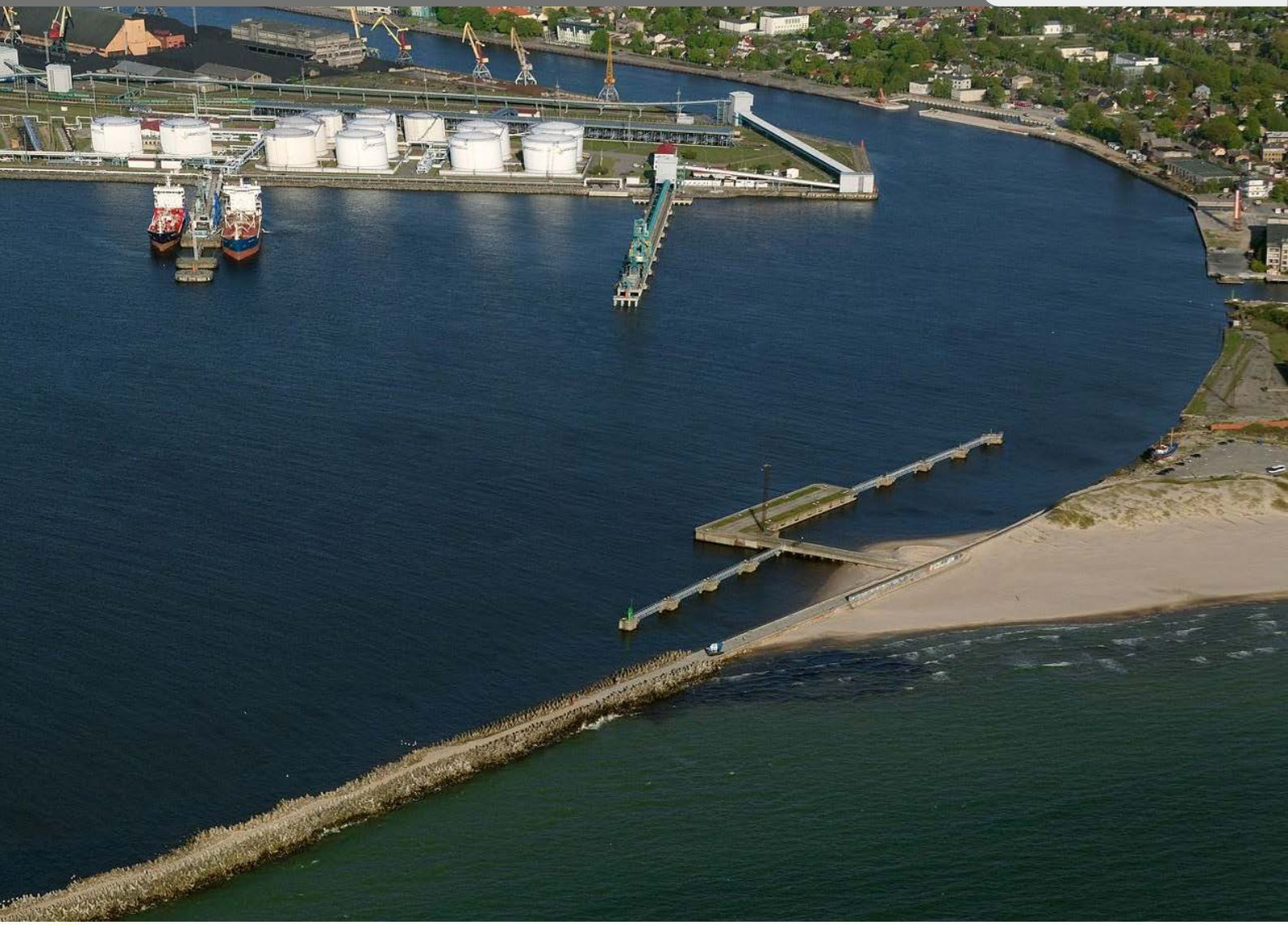
30 000+ tons per day bulk cargo

400 wagons are loaded

MACHINERY



The fuel control system was installed on several vessels for servicing the port – tugs, service vessels, pilot boats.



TASK

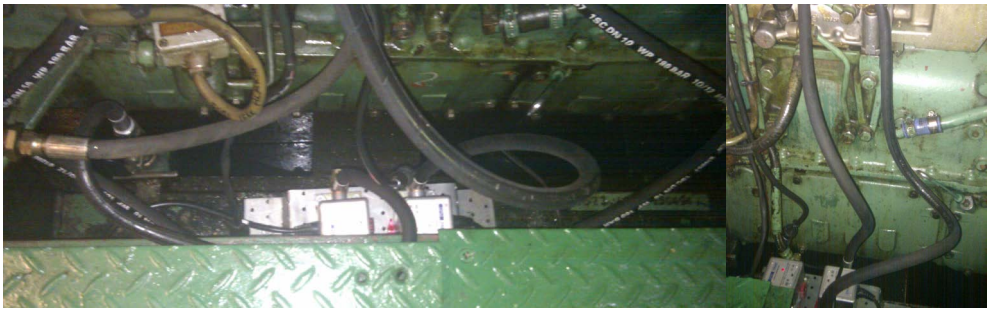
With the growth and rapid development of the port the problem of high fuel consumption arose. The capacity of the port – 5.5 million tons per year and the capacity of the Ventspils station – 3400 cars per day. Moreover the port has adoption "PANAMAX" class vessels with carrying capacity up to 82,000 tons, 14.1 m and 240 m long maximum draft.

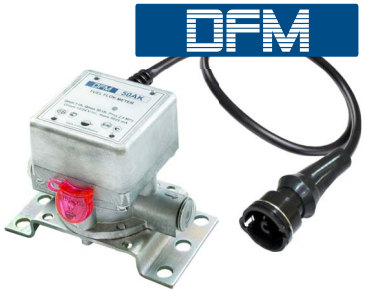
Top management of Freeport of Ventspils decided to find and implement the solution for 5 Vessels of different types. The task was additionally complicated by the special demands for extra safety a tight deadline.

SOLUTION

DFM fuel flow meters from Technoton specially designed to receive objective information about actual fuel consumption and vehicle working time. It also permits to reduce fuel and repairing costs.

DFM fuel flow meters has different output interfaces and possibility to work autonomously or be a part of telematic system.





DFM fuel flow meter

DFM fuel flow meters, installed on vessels

Ekaterina Mandryk-Kula, Technoton Baltic

"We decided to use 4 types of fuel flow meters (6 units per vessel) at the same time for optimal measurement accuracy and one tracking device mounted in control panel. Fuel flow meters DFM 100 AK, DFM 50 AK, 250AK and differential flow meter DFM 100DK gathered all necessary telematics data and transfered it to the web-based software, which is used by responsible staff and TOPs directly."

RESULT

The first results were evaluated after 2 weeks of operation. Dramatic reduction of fuel consumption reached 58.6%.

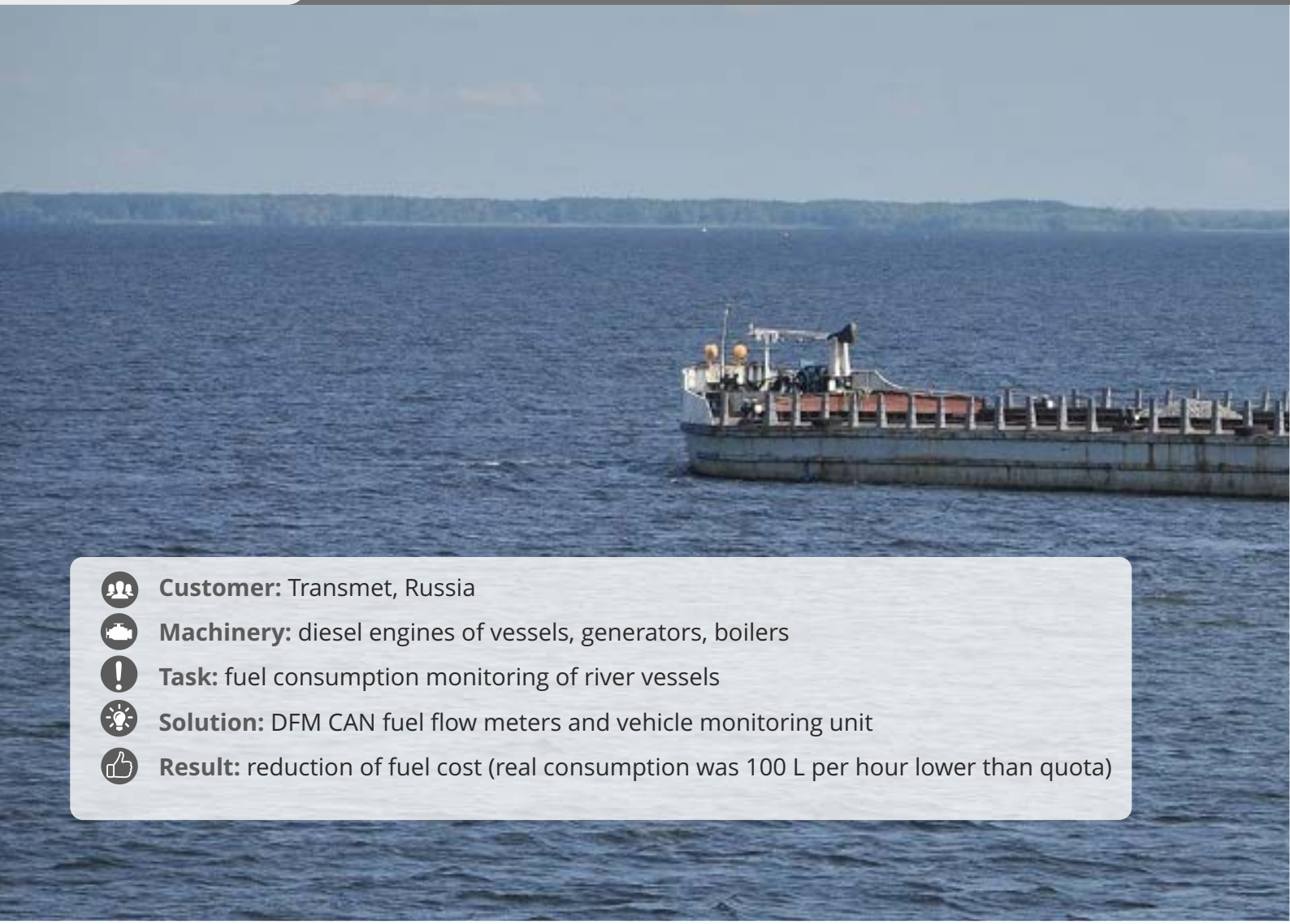
Efficiency of the picked solution is mainly connected with fuel manipulation deprivation and optimization of routes and business process.

M. Dums, Freeport of Ventspils technical department engineer

"Installed equipment allows controlling fuel consumption, as well as preventing any fuel manipulation. Solution gives us opportunity of day and night control and ability to avoid breakdowns, fuel leaks and unnecessary payments.

Installation of equipment was made on time and with the highest level of competance."

Dry-cargo vessels, Russia



Customer: Transmet, Russia

Machinery: diesel engines of vessels, generators, boilers

Task: fuel consumption monitoring of river vessels

Solution: DFM CAN fuel flow meters and vehicle monitoring unit

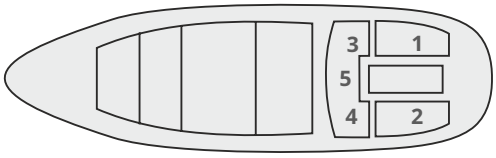
Result: reduction of fuel cost (real consumption was 100 L per hour lower than quota)

CUSTOMER

"Transmet" company has several directions of operation. One of them is transportation of goods by river vessels. Company owns dry-cargo vessels, such as "Kriushi", "Kozmodemiansk", "Ochakov". Vessels belong to "6th five-year plan" type: four cargo compartments and a superstructure on stern. Vessel's length is 94 meters, carrying capacity – 2000 tons, fuel tanks volume – 50 tons, crew – 9 people. Vessels were produced in 1956-1967 in shipyards of USSR and Romania.

Vessels are operated in Volga-Kama river basin and Northern Dvina river basin, also on Ladoga and Onega lakes.

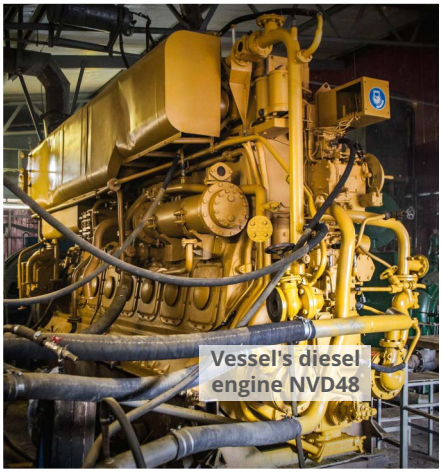
MACHINERY



Vessels of "VI five-year plan" type are quipped with: two engines, left (1) and right (2), main diesel generator (3), auxiliary diesel generator (4) and boiler (5).

Engines (6 NVD48 model) are in-line, six-cylinder, with water cooling and direct injection. Engine displacement is 232 L, engine power – 368 kW. Diesel generators are in-line, four-cylinder, with water cooling and direct injection. Engine power – 43 kW and 21 kW.

TASK



Vessel's diesel engine NVD48

Fuel consumption is accounted using calculation method. Fuel consumption quota is registered in regulatory documentation, which hasn't been updated for a long time.

According to current specification, fuel consumption of each NVD48 engine is 175 g/h.p.* hour. Total fuel consumption quota for both engines is about 200 l /h, quota for generators and boiler – about 25 l /h.

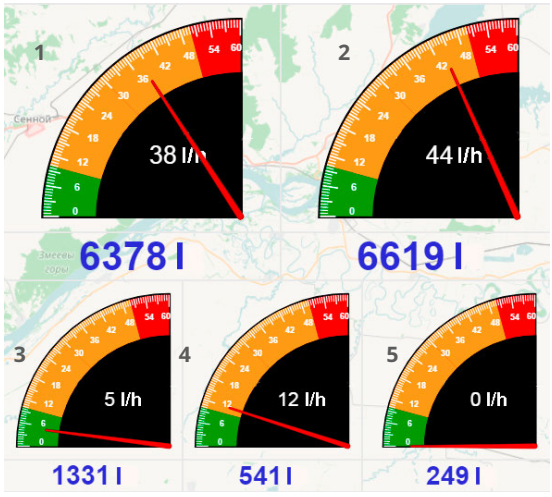
The customer believes that these values are highly overstated. The task was to implement fuel consumption monitoring system that would provide accurate information on hourly and total fuel consumption of each engine in real time.

Kriushi dry-cargo vessel became the first to be equipped with fuel monitoring system.

SOLUTION

Fuel monitoring system of autonomous hybrid units includes 5x DFM CAN fuel flow meters and 1x Galileosky Glonass/GPS v.5.0. online telematics unit. All units work within S6 Telematics interface.

DFM 250CCAN are mounted into fuel supply line of running engine. DFM 100CCAN are mounted into direct supply line of diesel generators and boiler.



Hourly and total fuel consumption:
1 – left engine;
2 – right engine;
3 – main diesel generator;
4 – reserve diesel generator;
5 – boiler.

DFM

DFM 250CCAN
fuel flow meter

Online telematics unit receives the following data from fuel flow meters via CAN/S6 interface:

- ✓ horly fuel consumption of every engine,
- ✓ total fuel consumption of every engine,
- ✓ operation time of every engine.

Also, tracking device receives additional data – fuel temperature and engine speed (from tachometer).

Information from tracking device is sent to dispatch service's computer in real time. All data is represented clearly on virtual dashboard of ORF4 telematics service. Dashboard's flexible interface allows to display data in any convenient form: charts, figures, arrow indicators, scales.

Nikolai Turetskov, Mercury NN (Technoton's partner)

"Technoton manufactures a wide range of DFM fuel flow meters for all kinds of vehicles.

On "Kriushi" vessel we mounted DFM CCAN fuel flow meter and a tracking devise with CAN input. All devices work within S6 Telematics interface. This is the most practical, simple and reliable solution for fuel consumption monitoring of vessel with several diesel engines."

RESULT

After implementing fuel monitoring system (5 fuel flow meters and online telematics unit) the customer receives reliable data in real time. Based on information about operation modes (engine speed, temperature) and fuel consumption of every engine, it became possible to define real average fuel consumption of:

- ✓ each engine – 39,5 l/h;
- ✓ each generator - 6,8 l/h;
- ✓ boiler – 5,9 l/h.

Average total fuel consumption when vessel is moving is about 100 L per hour. This is two times lower than regulatory documentation states. Fuel economy per one working hour is 3700 rubles (in June 2017 prices). Total costs for purchasing and mounting fuel monitoring system paid off twice during the first trip of the vessel.

Anatolii Ponomarev, Transmet

"We are completely satisfied with how Technoton products are working. Data about fuel consumption of every engine and generator is available in real time. We also like the format of getting reports – simple and clear virtual dashboard. All costs for equipment and its installation paid off several times on the first trip! We plan to install fuel consumption monitoring system on other vessels of our company."

Partner: telematics system provider, Sweden

Machinery: city and intercity buses

Task: fuel consumption monitoring of buses

Solution: Technoton CAN tools

Result: implementation of driving quality system

PARTNER

Technoton's corporate business partner – is one of the largest telematics system providers in Northern Europe. Offices of the company are located in Sweden, Norway, Finland, Estonia, Latvia and Lithuania.

The main sphere of the company's activity – solutions for road and rail transport monitoring, as well as for automation of industrial facilities. In 2019-20, the company has introduced Eco Driving quality system for buses, the first customer was one of major bus fleets in Sweden.

MACHINERY

VDL Citea

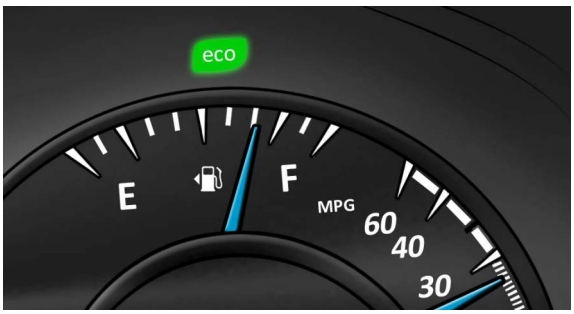
VDL Futura

Volvo 9500

Vehicle fleet includes VDL Buses and Volvo buses, over 700 buses for city and intercity transportation in total.
Seating capacity of VDL Citea city bus is no less than 100 passengers. Bus is equipped with a 6,7 liters Cummins diesel with capacity of 187 KW.
VDL Futura intercity bus is fitted with 45 - 60 seats. DAF turbo diesel is 10,8 liters in a volume and has capacity of 300 KW.
Volvo 9500 intercity is fitted with 45 - 60 seats. Volvo diesel engine is 7,7 liters in a volume and has capacity of 245 KW.

Standard fuel consumption of buses is from 25 to 30 liters per 100 km.

TASK



Our partner had to implement telematics system in bus fleet to execute Eco Driving quality system. That required:

- monitoring location and route of buses;
- data on the speed, acceleration/deceleration of the bus;
- data from the tachograph in real time;
- control of physical condition of drivers with a breathalyzer;
- diesel fuel consumption monitoring.

Data from tachograph is transferred to telematics unit via RS-232 input. Tracker uses GPS to determine location of the bus, its speed and acceleration.

Data on instant fuel consumption is available in CAN/j1708 bus, it's not possible to gather it from standard OBD II connector. Direct connection to information bus of vehicle is required to read and transmit data on fuel consumption.

After connecting tachograph, only RS-485 (ASCII protocol) digital input of telematics unit remains free. Thus, **to provide transferring of fuel data to telematics system, a special device, that allows converting CAN/j1708 bus messages to ASCII text format (understandable by a telematics unit), should be installed.**

SOLUTION

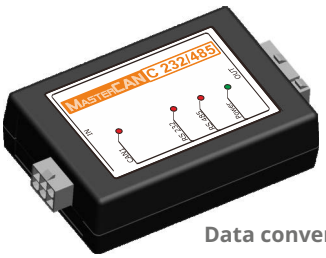
Telematics systems have been installed on over 700 buses. **To receive and convert data from CAN and j1708 information buses, CANCrocodile and 1708Crocodile contactless readers and MasterCAN C232/485 and MasterCAN V-Gate data converters were chosen.**

In Volvo buses, on-board information is transmitted via j1708 bus. 1708Crocodile contactless reader has been installed on 1708 bus to read it. Data gathered by the device is sent to the input of MasterCAN converter, which converts it to RS-485 data (ASCII text protocol). After that, data is transmitted to corresponding input of telematics unit.

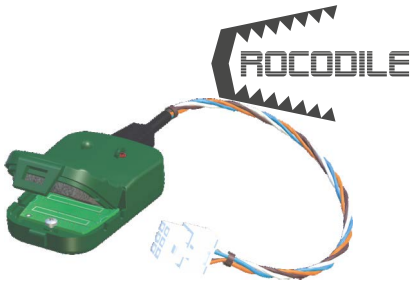
In VDL buses, information is transmitted via CAN j1939 bus. Conversion scheme here is similar as described above. To provide data reading and converting CANCrocodile contactless reader and MasterCAN C232/485 data converters are used.

MasterCAN data converter receives data on instant fuel consumption from information bus of vehicle and calculates total fuel consumption from the time of engine start.

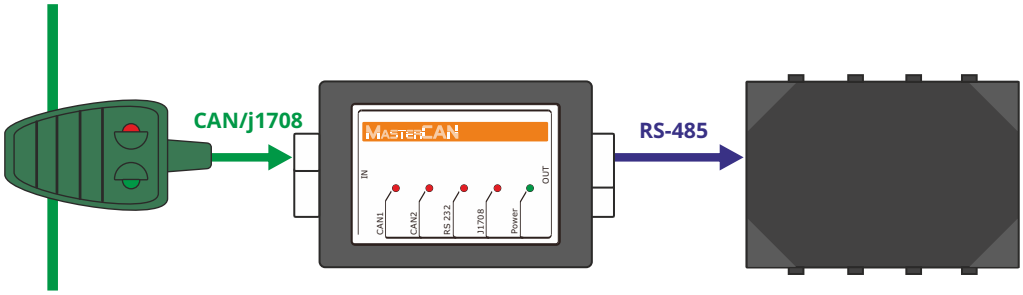
Crocodile contactless readers are installed on wires of information bus without electrical connection and damaging CAN wires. Devices safely read data without any impact on automotive electronics. Converters and readers are supplied from a bus power supply - no additional power source is required. This speeds up and simplifies installation of the devices.



Data converter



Contactless reader



Scheme of converting data from the standard CAN/j1708 bus to RS-485 data for tracker

Veronika Reut, Wagencontrol – Technoton representative in the European Union

"Technoton is going towards our client. We make devices not only in the standard version, but also release customized products for specific projects. In the present case, ***Technoton has manufactured a batch of data converters of a special configuration****. We have changed standard cables to cables with a mount hole to be connected to standard CAN sockets. Through the development of a new product – it has become easier to provide fuel consumption monitoring: we have installed only converters on the buses, we did without contactless readers."*

RESULT

After installation of telematics system was completed, bus fleet has received all the necessary information that allows implementing of Eco Driving system. **Thanks to MasterCAN data converters it was made possible to connect easily to CAN j1939 and j1708 information buses and gather data on fuel consumption.** Data on location, speed and acceleration of buses, speed and other parameters of engines, as well as data on fuel consumption - is sent to telematics service.

In addition to data on instant fuel consumption, data converter sums fuel consumption during the trip and transmits this data to tracker. Based on this information, management of bus fleet have developed requirements for quality of driving. The result of meeting these requirements is an increase in transport safety, fuel economy, and also a careful attitude of drivers towards buses, which leads to repair costs reduction.

Technical specialist of partner company *

"We have installed Technoton data converters and contactless readers to convert fuel data from information buses of vehicles. To install Technoton devices, we did not need to change electrical circuit of the bus. We had to configure only one converter and, after that, a file with setting profile was exported and written into memory of all other devices. So, configuration of hardware didn't take long."

**Data is hidden from public access to comply with GDPR requirements.*
Details on the project can be disclosed upon signing NDA and with the consent of our partner.

Customer: LLC «Rīgas satiksme», Latvia

Machinery: city buses

Task: fuel monitoring in fuel tanks of buses

Solution: DUT-E S7 fuel level sensors

Result: accurate fuel tank monitoring, automation of documentation

CUSTOMER

LLC "Rīgas satiksme" was founded in 2003 and now is a part of municipality of Riga. Main field of activity is transportation of passengers, maintenance of parking lots, and provision of vehicles for rent. Transport of "Rigas satiksme" runs on 74 routes - 6 tram, 18 trolleybus and 50 bus lines. The company's trams, trolleybuses and buses cover about 45 million km annually

3800+ employees

500+ city buses

140 million passengers transported per year

MACHINERY

The fleet includes buses for city transportation: Icarus, Mercedes-Benz Solaris Urbino and Mercedes-Benz Citaro.

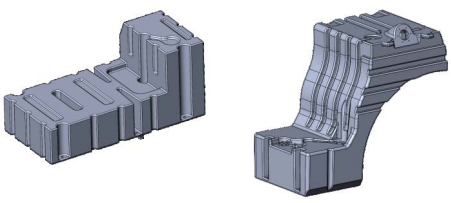
Mercedes-Benz Citaro O530


Mercedes-Benz Citaro O530L

Mercedes-Benz Citaro O530G

Fuel monitoring system was installed on Mercedes-Benz Citaro, O530 models (with two-axles), O530L models (with three-axles) and O530G (three-axle articulated). Maximum passenger capacity is 147 ÷ 177, engine power – 185 ÷ 260 kW, fuel tank volume –200 ÷ 400 liters.

TASK



Bus fuel tanks

Customer had to deal with problem of fuel monitoring in fuel tanks of buses. Accurate data on remaining fuel helps to plan operating hours of bus on the route, place and time of refuellings.

Passenger buses are designed in such a way that passenger cabin has maximum capacity. Place for fuel tanks is chosen "according to leftover principle" - near wheel arches, in the space between sheathing and body panels. It is impossible to mount fuel tank of large capacity with a form of parallelepiped or cylinder there. Therefore, fuel tanks of buses are usually of a complex shape.

It is impossible to accurately measure fuel level in such fuel tanks using only standard float sensor. Lever of standard sensor cannot move freely throughout the entire height of fuel tank.

Approximate fuel monitoring with an accuracy of "half a tank, give or take" did not suit the customer. So, it was necessary to install accurate fuel tank monitoring system with measurement inaccuracy not more than ± 1%.

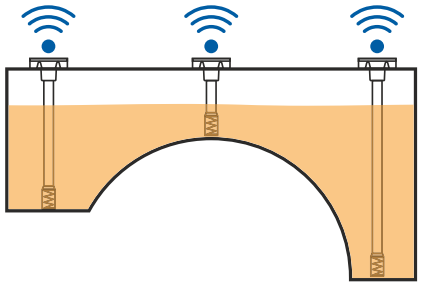
SOLUTION

SIA Autonams telematics system provider proposed to install fuel tank monitoring system, based on DUT-E S7 wireless fuel level sensors and telematics unit.

DUT-E S7 measures fuel level in fuel tank with accuracy of 0,1 mm. Fuel data is transmitted using wireless S7 Technology via BLE-channel (Bluetooth 4.X Low Energy) to receiver - telematics unit with BLE. It is also possible to monitor data on the screen of Android smartphone or tablet. Data is transferred without pairing with receiver, simultaneously to several devices - in BLE radio mode.

Installation of fuel tank monitoring system based on DUT-E S7 takes place twice as fast as when installing standard capacitive sensor - there is no need to lay connecting cables behind the sheathing of passenger's compartment. Errors during electrical connection of sensor to telematics unit are eliminated. DUT-E S7 operates without external power supply. Built-in battery provides completely autonomous operation for 5 years.

DUT-E S7 wireless fuel level sensor



Three DUT-E S7 sensors in a fuel tank of a complex shape – accurate fuel tank measurement without blind spots

Each complex shape fuel tank was equipped with two or three sensors. This made it possible to accurately measure fuel volume in such a case. When several sensors are installed in fuel tank, monitoring system provides fuel measurement without "blind spots" – so that, **measurement inaccuracy does not exceed ± 1%, regardless of the amount of fuel in tank.**

Data on fuel volume is transmitted to Teltonika telematics unit and, thereafter, to telematic service – Skybrake vehicle tracking system.

Ilmārs Piebalgs – SIA Autonams, Technoton's partner in Latvia

"To monitor fuel in complex shape tanks of buses, we offered to install DUT-E S7 wireless fuel level sensors. Firstly, installation of wireless sensors takes a minimum time - there is no need to lay a cabling system. Secondly, S7 Technology allows connecting several sensors to a single monitoring telematics unit directly, without using any additional devices. Thirdly, it is possible to monitor fuel not only on telematics service, but also on the screen of smartphone with the help of mobile application."

RESULT

Fuel tank monitoring system, based on wireless DUT-E S7 fuel level sensors and telematics units, was installed on 80 buses. Despite complex shape of fuel tanks, these sensors measure fuel volume with inaccuracy not more than ± 1%, and also determine the amount of fuel filled in.

Data on fuel level in tanks come to Skybrake vehicle tracking system. Manager of "Rigas satiksme" in real-time monitors current fuel remaining in tank of each bus and makes decision on the possibility of further work or necessity of bus refuelling. Skybrake vehicle tracking system allows monitoring fuel in tank (current volume, refuelling/draining). Fuel data is sent to specialized software for automatic drafting of reporting documentation - itinerary and trip ticket, reports for State Revenue Service.

Technical specialist, "Rigas satiksme" *

"DUT-E S7 fuel level sensors are the best option for monitoring fuel in bus tanks. Installation of devices took little time – we didn't have to remove buses from the routes and our company did not suffer losses due to idle time. Accurate fuel data comes in real-time and without interruption. Rīgas satiksme now plans to equip another 220 buses with fuel tank monitoring system. "

** Data is hidden from public access to comply with GDPR requirements.*
Details on the project can be disclosed upon signing NDA and with the consent of our partner.

TAM

Customer: TAM-EUROPE d.o.o. bus manufacturer, Slovenia

Machinery: VivAir airport buses

Task: fuel tank monitoring

Solution: DUT-E fuel fuel level sensor

Result: 40% costs saved for fuel tank components

CUSTOMER

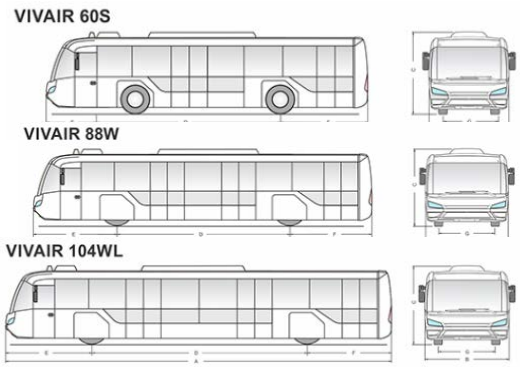
The plant TAM-EUROPE has been operating in Maribor (Slovenia) since 1946. Main plant's specialization is a production of school, intercity and airport buses (buses for delivering passengers from airport terminal to aircraft).

300+ employees

400+ airport buses manufactured yearly

75+ years in business

MACHINERY



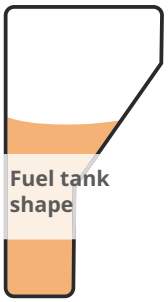
VivAir buses are the most famous products of the plant. They deliver passengers from airport terminal building to aircraft and back. VivAir buses operate in dozens of airports in European Union, Middle East, Russia and Ukraine.

Buses are equipped with MAN D0836 LOH 41 engines, 176 kW, aggregated with automatic transmission. Volume of fuel tank is 190 liters.

Main requirement to bus platform is the maximum passenger capacity. In addition, for the convenience of boarding and disembarking passengers, a bus must be low-floor. Based on these requirements, overall dimensions of bus and placement of main parts and components is designed.

TASK

Airport buses have high passenger capacity



Fuel tank shape

Due to the peculiarities of bus design, fuel tank of VivAir buses has specific shape - a height of about a meter, very narrow at the bottom and wide at the top (see picture).

Standard float (lever) fuel level sensor used in road trucks is not able to measure fuel level correctly. The reason is its design: sensor's lever cannot move freely over the entire height of the tank. For such a tank, development of a special design of sensor is required.

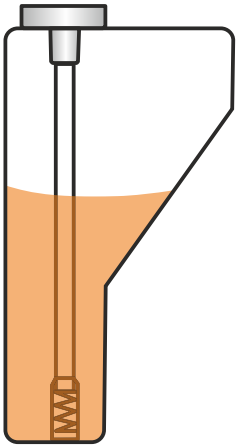
Representatives of TAM-EUROPE contacted several manufacturers of float sensors, but prices of non-standard sensors in the quantities necessary for TAM-EUROPE (about 400 units per year) did not fit into the project cost, in addition, delivery time was too long.

SOLUTION

To monitor fuel in tanks of VivAir buses, EU distributor of Technoton products (Wagencotrol company) offered DUT-E AF fuel level sensors of a custom design.

DUT-E AF has a capacitive principle of operation, there are no movable parts used in design, what ensures high reliability. The sensor measures volume of fuel in tank with high accuracy – measurement inaccuracy is within 1%. Since the sensor's tubes reach almost to the bottom of tank, this allows to measure fuel level and volume from lowest possible to maximum possible point.

DUT-E fuel level sensor



DUT-E in VivAir fuel tank

By special order of TAM-EUROPE, DUT-E AF sensors of a specific length were made – the length of 960mm is corresponding to the height of VivAir bus tank. This allowed to install sensor in fuel tank without additional time loss for trimming or extending the length of measuring probe of sensor.

Calibration table for the tanks of VivAir buses, where DUT-E AF were installed, as well as all necessary signal processing settings were stored in internal memory of DUT-E AF.

Yury Lavrentiev, Wagencontrol s.r.o. (Technoton Distributor)

*"**We offered TAM-EUROPE to make a customized version of DUT-E AF fuel level sensors**, fully adapted and configured for specific fuel tanks. At their factory, the sensor is just installed in tank and connected to dashboard - additional training on sensor configuration for plant workers is not required.*
The delivery time of customized version of DUT-E AF fuel level sensor is 2-3 weeks. This time frame completely suits the customer and allows them convenient planning of purchase of components for production."

RESULT

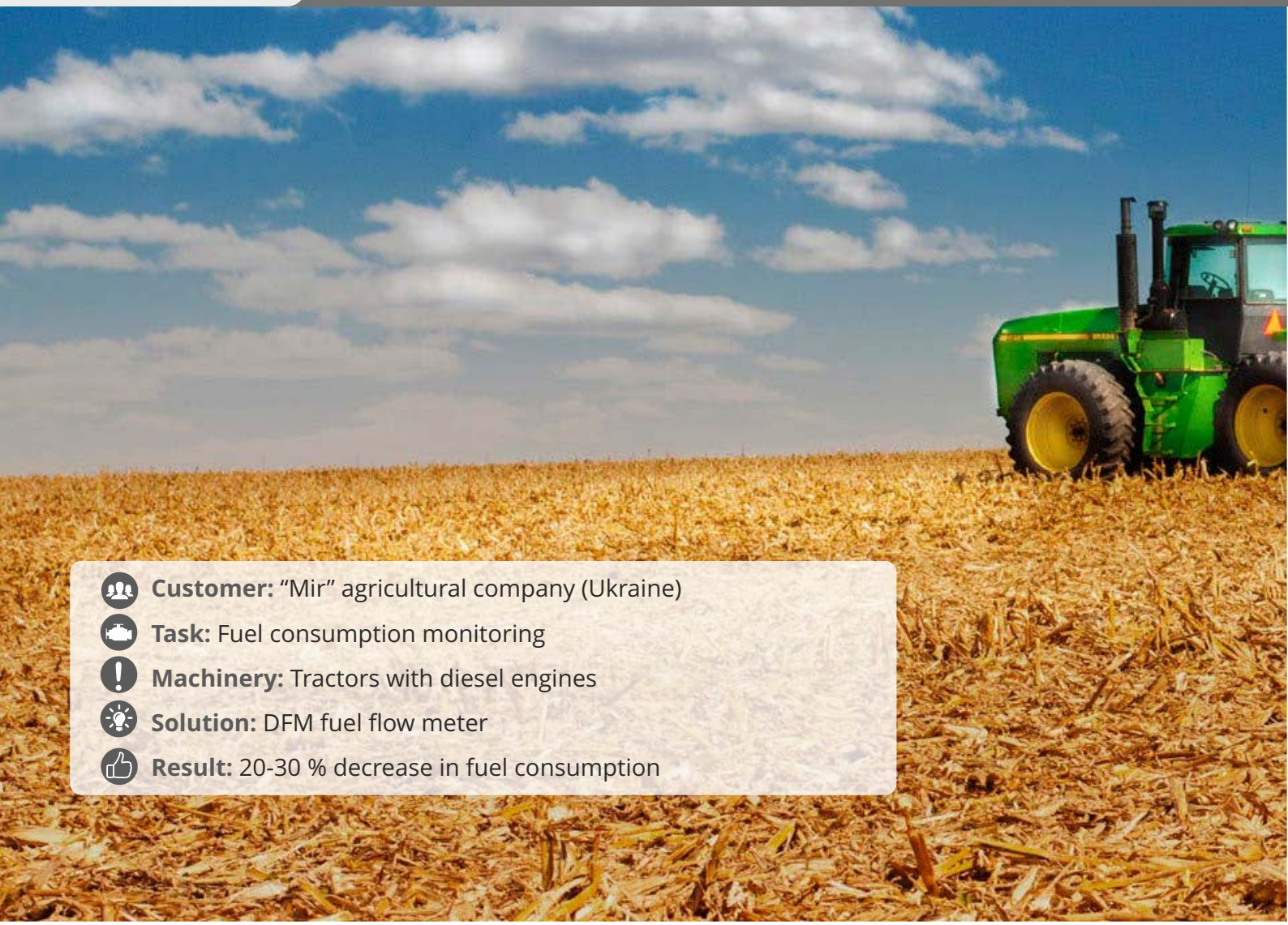
In 2017, specially manufactured modification of DUT-E AF saved TAM-EUROPE about 40% of the budget allocated for this type of components.

In addition, TAM-EUROPE plant has gained additional flexibility in production planning and formation of order for components - **delivery to TAMEUROPE warehouse takes 2-3 weeks** from the moment of sending the order to Wagencontrol s.r.o.

Thus, TAM-EUROPE received a ready-for-use product that fully complies with the requirements of design documentation. During bus assembly process, it is only needed to install the sensor in a tank and connect signal cable to a standard analog-to-digital converter, from which the signal is transferred to dashboard.

Čedo Malić, TAM-EUROPE

"We spent a lot of time looking for suitable fuel level sensors for VivAir buses. Proposals of other suppliers did not suit us either because of design, or because of price and delivery time. DUT-E AF functions exactly as we expected. It is very important for us that we get the sensors already fully configured, having required length of measuring probe and with a special mounting plate made according to our drawings.
Thank you for very good and high-quality product, which we will continue to install on VivAir buses."



Customer: “Mir” agricultural company (Ukraine)

Task: Fuel consumption monitoring

Machinery: Tractors with diesel engines

Solution: DFM fuel flow meter

Result: 20-30 % decrease in fuel consumption

CUSTOMER

“Mir” agricultural company was established in 2001 on the base of collective farm, which existed for 60 years. Over the years, “Mir” became leading agricultural company in Kirovogradskaya region of Ukraine.

“Mir” specializes in crop (wheat, corn, sunflower, beet, peas) and livestock production, milk and sugar production.

70+ employees

30+ machines

4500+ hectares of arable land

MACHINERY

MTZ-80

John Deere 8310R

“Mir” mainly uses MTZ-80 and John Deere 8310R tractors.

MTZ-80 tractor has been producing since 1974. Tractor's engine power is 80 h.p. , volume of fuel tank is 130 L.

John Deere 8310R has been producing since 2011. Tractor's engine power is 310 h.p., volume of fuel tank is 695 L.

TASK

From the beginning of operation, all tractors of agricultural company were equipped with fuel monitoring system which includes fuel level sensor and tracking device connected to online telematics service.

The system determines fuel volume and shows tan refilling and fuel draining from tank. However, it has considerable shortcomings. Agricultural machines often work on rough terrain, which causes noticeable fluctuations in fuel tank. In this case fuel level sensor can't determine fuel volume accurately. Fuel consumption volume, which is calculated on telematics server, differs much from reality. Also, subscription fee is charged for using online telematics service.

Top management of “Mir” agricultural company decided to equip tractors with devices, that can measure engine fuel consumption and display received data without connection to telematics service.

SOLUTION

DFM autonomous fuel flow meters are mounted into fuel supply line of vehicle's engine and measure actual fuel consumption.

Autonomous fuel flow meter is equipped with display, where instant, total and fuel consumption in different workload modes are shown. Technical specialist sees this data and records it in special journal (statement).

Autonomous fuel flow meter DFM 250B and DFM 100B

Also, information about interference into operation of fuel flow meter is registered and shown on display.

Specific model of fuel flow meter and installation scheme is chosen depending on fuel consumption volume and specifications of tractor's fuel supply system. DFM 100B fuel flow meters were mounted on MTZ-80 tractors, DFM 250B – on John Deere 8310R tractors. Fuel flow meter installation doesn't prevent fuel flow through the supply line. Autonomous fuel flow meter is power-supplied from embedded battery and there is no need in connection to tractor's electric system.

Artyom Pepelyavev, Technoton

"Agricultural company's primary requirement was accurate fuel volume monitoring in harsh environment. In current economic situation, customers usually request solution with minimum additional operational cost.

Technoton suggested to install autonomous DFM fuel flow meters. It allows to implement effective fuel monitoring system without installation of vehicle tracking device and paying subscription fee for telematics service. These models of fuel flow meters are in great demand."

РЕЗУЛЬТАТ

Autonomous DFM fuel flow meters were installed on 16 tractors at the beginning of 2016. After installation, **fuel economy reached 20-30 %** (depending on model and technical condition of engine). It took **2 month to return costs** of purchasing and installation of flow meters.

Robust design of DFM fuel flow meter ensures performance even in sever conditions of operation. DFM fuel flow meters work without any failures for almost two years already.

Vladimir Gavrush, director of "Mir"agricultural company

"Technoton fuel flow meters are reliable and accurate devices. We receive data on real fuel consumption after the flow meters were installed on MTZ and John Deere tractors. Now we can optimize fuel costs and as result - increase our profitability.

Technoton products are modern high-tech equipment, affordable and reliable. We are planning to install DFM fuel flow meters on other tractors and machines in our company fleet."

Customer: JV BEK CLUSTER, Uzbekistan

Vehicles: tractors and harvesters

Task: fuel consumption monitoring of agricultural vehicles

Solution: differential DFM D fuel flow meters

Result: 30% reduction of fuel consumption

CUSTOMER

The joint Uzbek-British venture "BEK CLUSTER" is one of the largest agricultural producers in the country. The company specializes in growing of grain cultures and cotton. "BEK CLUSTER" owns the largest complex of hydroponic greenhouses for growing tomatoes and other vegetables in Uzbekistan. A research center is being created in the company, and shortly, own factory focused on production of cotton fabric will be launched.

5000 employees

35 000 hectares of arable land

300+ units of machinery

VEHICLES

Main agricultural machinery fleet includes:

- 120 units of NewHolland universal tractors – power 110 hp, fuel tank 250 l, fuel consumption 26 l/h;
- 36 units of cotton-growing tractors TTZ – power 99 hp, fuel tank 115 l, fuel consumption 22 l/h;
- 21 units of Kirovets general-purpose tractors – power 300 hp, fuel tank 640 l, fuel consumption 49 l/h;
- 46 units of Case cotton combine and thresher harvesters – power 270-300 hp, fuel tank 570-750 l.

According to standards, fuel consumption of tractors is 28-30 l / ha, of combine harvesters – 32 l / ha. On average, one unit of machinery cultivates from 20 to 30 hectares per day. So, daily from 140,000 to 200,000 liters of diesel fuel are written off for vehicles (at a price of $ 0.55 per liter, total fuel costs amount to $ 75,000 – $ 110,000 per day).

TASK

The enterprise had to solve three urgent tasks.

1. **Monitoring machinery operation in field** – precise definition of cultivated area, volume of daily work, route of movement from parking areas to a field and back. These data provide an accurate calculation of machinery efficiency, reduction of inappropriate mileage, and also allows tying driver's/operator's wages to the results of their work.

2. **Fuel consumption monitoring** – measurement of real hour consumption of each unit of machinery, fuel consumption per day. Previously, when the fuel was accounted according to quotas, the economic efficiency of production was determined with a large inaccuracy. Over and above, management of the enterprise had suspicions, that some workers were draining fuel from vehicles and machines.

3. **Machine running time tracking** – total engine operating time and by the modes (Idle, Optimal, Overload). Analysis of data on engine operating time allows:

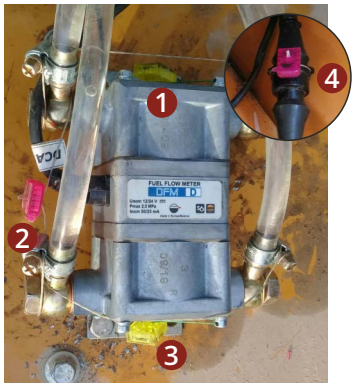
- reducing operating time in non-optimal modes and thereby increase engine's life cycle;
- carrying out maintenance not according to “same for all” standards, but to actual engine operating time.

SOLUTION

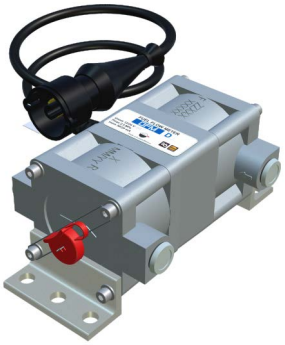
Fuel consumption monitoring systems were installed on 300 units of client's machinery and vehicles. Each system includes DFM D differential fuel flow meter with CAN interface and a GPS tracker.

Differential fuel flow meter directly measures fuel consumption in supply and return fuel lines and calculates the difference in flow rates. There is no need to change engine fuel scheme – this greatly simplifies and speeds up flow meter installation.

The body of flow meter is sealed to provide protection against interference. After installation, the connections to fuel lines and connection module of signal cable are sealed.



Sealing of the flowmeter's body ❶ connections to fuel lines ❷, ❸ and cable connector ❹



DFM D differential fuel flow meter

Data gathered by flow meter goes to Bitrek GPS tracker with CAN interface. The tracker transmits information to a specialized telematics service for agricultural land monitoring – Cropio.

Muchtarov Aziz, CEO of Technoton Dealer Center in Uzbekistan

"To solve the task of fuel monitoring and engine operating time tracking, we offered to install DFM D differential fuel flow meters with CAN interface. Our client was satisfied with accuracy of the fuel meter and with the speed of installation. It turned out, that autonomous mode, that allows gathering data when external power supply is switched off thanks to in-built battery of DFM, is very useful. Even if the power is turned off, all data is registered in digital Counters in an internal memory of DFM fuel flowmeter. After the power supply is back all data is sent to telematics server."

РЕЗУЛЬТАТ

As a result of telematics system installation, all the tasks have been solved successfully.

1. Telematics service provides online information on the location and route of each unit of machinery, data on the cultivated area or the weight of the harvested crop.

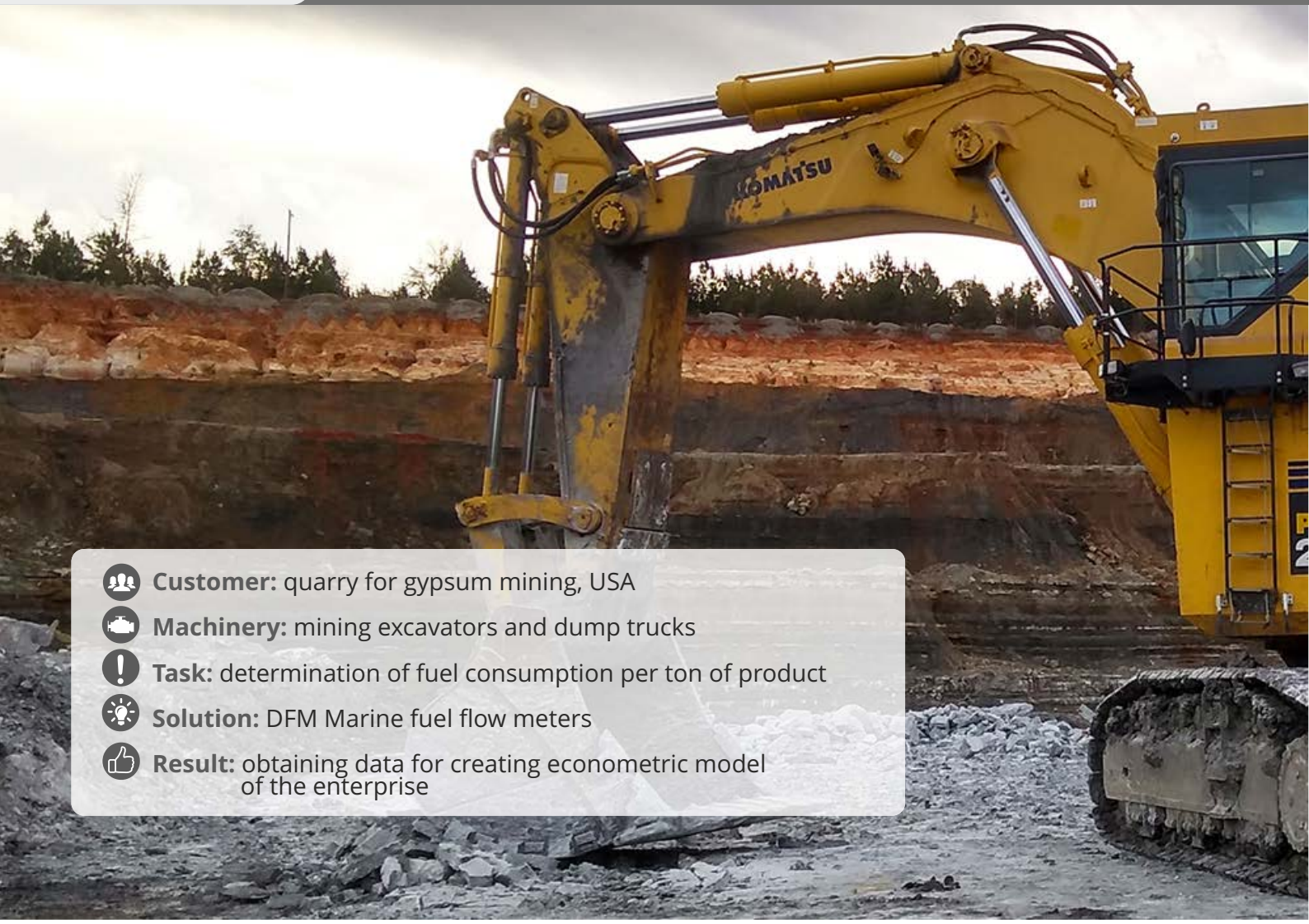
2. Data on real fuel consumption received from fuel flow counters made it possible to build an **accurate fuel accounting system**. Consumption rates have been optimized, fuel theft has been stopped. Fuel costs have been reduced by 30%!

3. Maintenance is carried out according to **actual engine operating time**. All oils, filters and other consumables are changed according to their actual condition, which leads to an increase of engine's life.

Oybek Satibaldiev, BEK CLUSTER founder

"DFM D fuel flow meters provide accurate and complete information on fuel consumption and running machinery. Occasions of fuel theft have completely stopped.
We also were delightfully surprised to get an unexpected additional effect. Tractor drivers have stopped selling stolen fuel and, to maintain their income level, have started to work better – so, their labor productivity has increased by 15%."

Mining excavators and dump trucks, USA



Customer: quarry for gypsum mining, USA

Machinery: mining excavators and dump trucks

Task: determination of fuel consumption per ton of product

Solution: DFM Marine fuel flow meters

Result: obtaining data for creating econometric model of the enterprise

КЛИЕНТ

The client is a transnational corporation*. A key area of work is development of quarries of non-metallic materials around the world, production of construction materials, high-hardness ceramics, isolation valve, architectural glass. **Gypsum quarry in the United States** is one of the corporation's business units.

170 000 employees

1000+ companies from **67** countries

€ 40+ billion annual turnover

* Hereinafter, data is hidden from public access to comply with GDPR requirements.

ТЕХНИКА

Various machinery for mining, loading and transportation of gypsum stone from an open cut works in a quarry. Several dump trucks and excavators were chosen for the project.


CAT 777D

Dump truck
CAT 3508V EUI engine,
volume/power 34l/699 kW


Komatsu PC 2000

Crawler excavator
Komatsu SAA12V140E-3 engine,
volume/power 30 l/728 kW


Komatsu PC 1800

Crawler excavator
Two Komatsu SAA6D140E engines,
volume/power of each 15 l/670 kW

TASK

Main task of the client is to implement telematics system at the enterprise to provide onlinemonitoring of efficiency of mining machinery. This is a part of global challenge of creating adigital econometric working model of a quarry.

Fuel consumption, required to extract one ton of gypsum stone, – is the most important parameter to calculate the efficiency of machinery performance. To determine fuel consumption per ton of product it is necessary to receive accurate data on the current fuel consumption of each machinery unit in real-time.

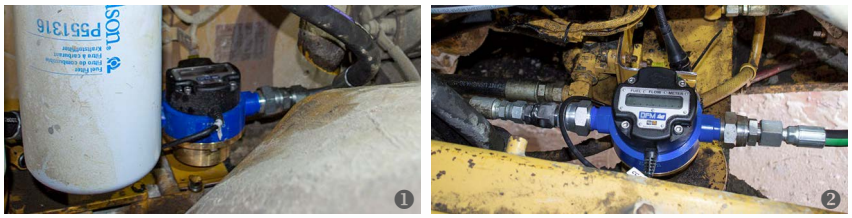
The initial part of the project includes installation and run-in test of telematics system on machinery, chosen before. Further, the system will be scaled to all units of machinery, operating in the quarry.

Dump trucks and excavators are equipped with standard CAN bus. Since vehicles were released about 20 years ago, data set in CAN bus is limited – there is no data on fuel. Therefore, it was decided to install flow meters directly in a fuel system to provide accurate measurement of current fuel consumption.

SOLUTION

DFM Marine fuel flow meters have been installed in a fuel system of dump trucks and excavators to provide accurate fuel monitoring. This hardware is designed for direct measurement of diesel fuel consumption on heavy machinery: vessels, locomotives, powerful generators, mining equipment.

Each dump truck is equipped with two flow meters - in supply and return fuel line of engine. Each excavator is equipped with four flow meters: Komatsu PC1800 has two engines, and an engine of Komatsu PC2000 has two supply lines and two return lines. **Flow meters operate in pairs, in differential mode. Hourly fuel consumption in each fuel line is 300-500 l/h.**



DFM Marine installed in supply ❶ and return ❷ lines

DFM Marine
fuel flow meters

DFM Marine with CAN j1939 interface were chosen for this aim. Flow meters are connected to a single digital bus with common power supply using S6 Technology. All DFM Marines are configured from one point. S6 technology allows creating a network of up to 16 DFM Marine fuel flow meters. **Data from all of them is transmitted to a single CAN input of telematics unit.**

Data from flow meters is transferred to telematics unit, designed especially for mining machinery monitoring, and, thereafter, is sent to telematics service. Both telematics unit and service were developed by Technoton engineers.

Now the client receives all necessary data on:

- instant fuel consumption;
- otal fuel consumption;
- fuel consumption in the supply and return lines;
- fuel consumption and engine operating time by modes: "Idling", "Optimal", "Overload", "Tampering".

Engineer of Technoton telematics system provider

"We have chosen DFM Marine flow meters by Technoton for three reasons. Firstly, it is reliable hardware, that works without breakdowns or failures in difficult machinery operation conditions. Secondly, there are models of DFM Marine with CAN j1939 interface. This provides easy configuration of flow meters and enables connection of several counters to one CAN input of telematics unit simultaneously. Thirdly, measurement inaccuracy is not more than ± 0.5%, this means, accurate fuel accounting is guaranteed".

RESULT

Telematics system, which was installed on dump trucks and excavators, works reliably and in real time transmits information about fuel consumption and engine operating time. Data is exported to software packages that calculate the economic efficiency of production.

Data on the operating time of engines in various modes is also used to plan maintenance based on the actual operating time of engine, which significantly increases service life of machinery.

Management of the quarry expeditiously oversees data on fuel consumption per ton of gypsum stone. In the near future, a digital econometric model of enterprise will be built on the basis of this data.

Head of the technical and service department of the quarry*

"As a technician, I especially liked that Technoton experts came to us and installed telematics devices on machinery directly in the quarry. Installation was very fast, with minimal machinery downtime. We plan to install fuel flow meters on other vehicles of our quarry. Now top management of our company is examining a report on the project implementation. We look forward to making a decision on installation of telematics system by Technoton and Talpa Solution at other mining enterprises."

**Data is hidden from public access to comply with GDPR requirements. Details on the project can be disclosed upon signing NDA and with the consent of our partner.*

Customer: Thiess, mining services provider (Australia)

Task: fuel volume monitoring for machinery work planning

Machinery: lighting masts with diesel engines

Solution: DUT-E fuel level sensor + tracking device

Result: reduction of maintenance costs by 20% due to optimization of production processes

CUSTOMER

Thiess was founded in 1933 and eventually became one of the biggest companies in Australia and Asia on construction and mineral extraction markets. Nowadays company carries out several large-scale projects in Australia, Indonesia, Botswana, Mongolia, Canada, Chili, India. Thiess extracts various types of minerals: coal, iron and copper ore, gold, diamonds. Extraction is conducted both by ground and mine methods.

12 000+ employees

700 M+ dollars of annual net profit

1300M+ dollars of equipment cost

ТЕХНИКА

Lighting masts are designed for illumination of working sites (pits, transect, etc) with no stationary power supply. Their design features are fuel tank of higher volume, diesel generator for 24 V direct current, lighting system with LED lamps.

Tracking device is mounted on the mast (equipment geolocation, transmitting data on location and fuel volume in tank).

There are two types of lighting masts:

- ✓ single mast (fuel tank volume 255 L, 3 kW one-cylinder engine, fuel consumption 0,6 L per hour, current 100 À, 4000 lamps);
- ✓ double mast (fuel tank volume 425 L, 5 kW two-cylinder engine, fuel consumption 1 L per hour, current 200 À, 6000 lamps).

TASK

Lighting masts ensure continuous operation of mining companies. Time of mast's operation until emptying one fuel tank is about 400 hours. After that, technical support specialists are sent to it to refill the tank and make current technical inspection.

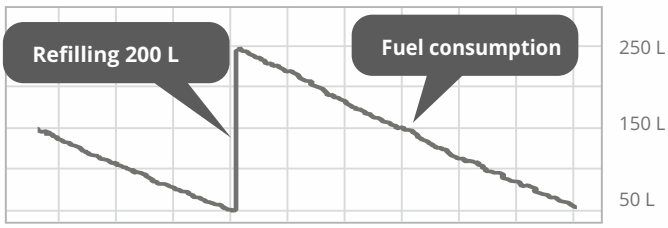
To plan optimal schedule for technical servicing of machinery, it is necessary to monitor remaining fuel volume in real time and send data to dispatch service. For that purpose, fuel level sensor, which can send precise fuel volume data to tracking device, is needed.

SOLUTION

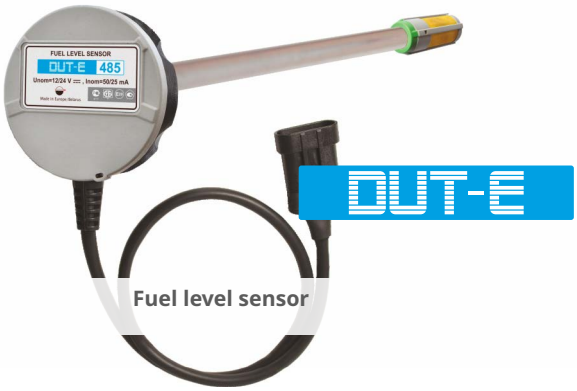
DUT-E 485 fuel level sensors are used for accurate fuel volume monitoring in tanks of lighting masts.

Sensors determine fuel volume in the tank with high accuracy (measuring error is 0,2%). Volumes of fuel refilling and draining are measured in real time.

Received data is sent to tracking device via RS-485 digital interface (fuel level in millimeters, fuel volume in liters, information about refilling and draining). Data from tracking device is sent to PC of dispatch service. Data on geolocation of mast, fuel volume in tank and generator operation time is available in form of reports and diagrams.



Fuel volume in tank chart



Fuel level sensor

When fuel volume in tank is 10%, dispatcher decides to send technical service specialist to the lighting mast. So, refilling of fuel tank and maintenance of lighting masts occurs at the moment when it's necessary.

Gregory Volejko, Technoton

"DUT-E fuel level sensors is reliable and accurate device for fuel volume measurement. Technoton produces a wide range of fuel level sensors with various lengths and interfaces for all kinds of vehicles and stationary tanks. Fuel level sensors with RS-485 digital interface were mounted on fuel tanks of lighting masts. These sensors are compatible with tracking devices of world's leading manufacturers."

RESULT

DUT-E 485 fuel level sensors were mounted on 150 lighting masts for more than a year ago. Sensors are working together with tracking devices. On dispatcher's request data on fuel volume in tank of lighting masts is sent.

All fuel level sensors are working in normal mode and with the declared accuracy. Due to rapidity in receiving information about fuel volume in tank, it became possible to optimize routes and schedule of technical service. Fuel costs and overhead costs of technical service decreased by 20%.

Apurba Paul, Thiess company

"Technoton products – optimal choice for our equipment, which is operated in harsh environment (high temperature and strong winds). We have seen high reliability and efficiency of devices. DUT-E fuel level sensors work continuously in conjunction with tracking devices, used by our company. We are going to mount more Technoton products on lighting masts and other equipment."

Road construction machinery, Philippines

Customer: Vic Florido, entrepreneur (Philippines)

Task: fuel theft prevention on road building machinery

Machinery: excavators, dump trucks, loaders

Solution: DUT-E GSM fuel level sensor

Result: fuel costs reduction (drivers stopped stealing fuel from tank)

CUSTOMER

Vic Florido's field of activity is road building and maintenance. Works are carried out on the southeast of Negros island (Philippines).

25 machinery units are used for digging and ground forming works, for bulk cargo transportation, for employees transportation.

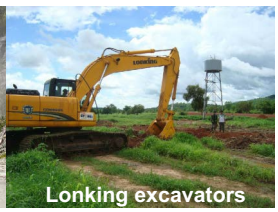
MACHINERY


Sinotruk dump trucks


Hyundai minibuses


Lonking front end loaders


JAC dump trucks


Lonking excavators

Vehicles and road building machinery of Chinese brands are used.

- ✓ JAC dump trucks (6x4 wheel configuration, capacity 17 t, engine volume 11,5 L, engine power 375 h.p., fuel tank volume 350 L).
- ✓ Sinotruk dump trucks (6x4 wheel configuration, capacity 11 t, engine volume 9,5 L, engine power 250 h.p., fuel tank volume 300 L).
- ✓ Lonking front end loaders (capacity 3,5 t, engine volume 6,8 L, engine power 140 h.p., fuel tank volume 250 L).
- ✓ Lonking excavators (bucket volume 1,1 m , engine volume 5,9 L, engine power 150 h.p., fuel tank volume 380 L).
- ✓ Hyundai minibuses (engine volume 2,5 L, engine power 120 h.p., fuel tank volume 75 L).

TASK

Fuel theft from tank causes great losses

Fuel theft is common in Philippines. Average salary is less than $270. Cost of diesel fuel is about $0,65 per liter. Fuel drain and further resale became a profitable activity for many drivers, including those who work on customer's vehicles.

Another problem is ineffective operation of vehicles. It is common for drivers to have long breaks or coming back late from lunch. There is no way to control drivers by personal visits because working sites are far away from each other.

To solve these problems customer contacted Technoton's regional integrator. The task was to receive various information in real time: vehicle's location, fuel volume in tank, filling and draining, reports on engine hours and idle time. Solution should be universal for all types of vehicles with no need of complex maintenance.

SOLUTION

For accurate fuel volume, route and location monitoring DUT-E GSM fuel level sensors were mounted on customer's vehicles.

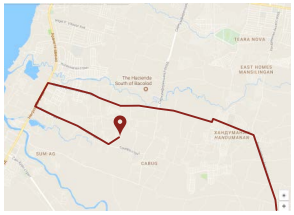
DUT-E GSM is “two-in-one” device. It combines fuel level sensor with telematics unit. DUT-E GSM is easy to install and it is more resistant to interference than standard «sensor + terminal» combination.

Sensors measure fuel volume in tank with high accuracy (inaccuracy is just 1%). Volumes of filling and draining from tank is measured and reported in real time.

DUT-E GSM

DUT-E GSM fuel level sensor – fuel volume measurement and location detection

ORF4 telematics service – data visualization



Route and location monitoring

Change of the fuel volume in tank

DUT-E GSM detects vehicle's location and sends following data to fleet operator's computer:

- ✓ fuel level in millimeters and fuel volume in liters;
- ✓ information about filling and draining events (precise volume and place of the event);
- ✓ route and location of vehicles;
- ✓ reports on engine hours and idle time.

ORF4 telematics service allows to display vehicle operation data in an easy-to-use form (reports, charts, diagrams).

Alexey Pinchuk, Technoton

"The task was to provide an effective fuel monitoring and vehicle tracking system that would be suitable for different vehicles (dump trucks, minibuses, excavators and other roadbuilding machinery).

We decided to use DUT-E GSM fuel level sensor. For more than half a year, DUT-E GSM in conjunction with ORF4 telematics service provides customer with all necessary data."

RESULT

After DUT-E GSM installation customer can control the route and location of vehicles.

Manipulation with fuel and misuse of vehicles had stopped. Data on fuel (remaining fuel in tank, filling and draining) is always available.

20% fuel economy.

Vic Florido, entrepreneur

"Technoton offered unique solution – one device that can both measure fuel and detect location. DUT-E GSM fuel level sensors are fast to install, so the downtime of vehicles because of installation was short. Sensors work reliably in harsh environment (dust, high humidity, heat), which is common for places of machinery operation. DUT-E GSM were installed on 25 machinery units (vehicles, loaders, excavators). Thanks to 20% fuel consumption economy, it took less than three weeks to return costs of purchasing this equipment."

Customer: Gomel railroad transportation company (Belarus)

Machinery: Amkodor wheel loaders

Task: fuel tank monitoring, vehicle position and route monitoring

Solution: DUT-E GSM fuel level sensor

Result: 20-30% fuel costs saving

CUSTOMER

Gomel railroad transportation company was founded in 2003. It carries out delivery of various cargoes all over the world by rail and other modes of transport. Gomel railroad transportation company possesses various railway cars (covered, platforms, cisterns), containers, automobile and tractor vehicles (trucks, buses, loaders, semi-trailers, refrigerators, vans).





MACHINERY

Large amount of loading and unloading operations at company's sites is performed by universal wheel loaders Amkodor 342 and Amkodor 352.

Amkodor 342 (carrying capacity 3800 kg) is equipped with a diesel engineD-260.1, rated power 155 hp.

Amkodor 352 (carrying capacity 4700 kg) is equipped with a diesel engine D-260.9, rated power 180 hp.

Both models have a 215-liter fuel tank. Standard fuel consumption is 7 – 11.2 liters per machine-hour (depending on the type of work done).

TASK

Standard fuel consumption of wheel loader is determined depending on operation mode: ground grading, loading of soils, movement of cargo, snow cleaning, sweeping, operation with boom, transport mode. Fuel consumption quotas, depending on the type of work, is in 7 to 11.2 liters per machine hour range, i.e. can differ in 1.5 times.

Wheel loaders perform work at various loading and unloading sites of Gomel railroad transportation company. Sites are located in Gomel region (City of Gomel, Zhlobin, Kalinkovichi, Zhitkovichi, Yelsk, Rogachev and others).

Loading and unloading points are located far away from each other. Duration and type of work performed cannot be monitored visually. Lack of control leads to situation when drivers overstate volume of work done and volume of fuel used – the surplus is taken by drivers and other employees for personal use. As a result, the company incurs unnecessary financial losses.

РЕШЕНИЕ

For accurate monitoring of fuel volume in fuel tank, as well as for wheel loaders position and route tracking over GPS/GLONASS, DUT-E GSM fuel level sensors were installed.

DUT-E GSM – is a two-in-one device: fuel level sensor and vehicle telematics unit in one body. DUT-E GSM has significant advantages over standard combination “sensor + tracker”: DUT-E GSM is installed, connected and configured quicker because twice less operations should be performed.

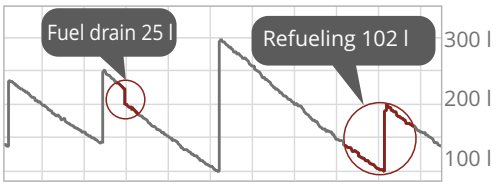
DUT-E GSM measures fuel volume in the tank with high accuracy. Measurement inaccuracy is less than 1%. The sensor measures ambient temperature and makes an automatic data correction to provide customer with clear and solid information on fuel volume.

DUT-E GSM sends real-time on-board Reports to ORF4 telematics service. Onboard Reports contain:

- ✓ fuel level (mm) and fuel volume (l) in the tank;
- ✓ notifications on Events: "refueling ", "fuel drain", “engine start/stop” indicating the time and place of the Event;
- ✓ route, location and speed of wheel loader;
- ✓ reports on operation and idling time

DUT-E GSM

DUT-E GSM fuel level sensor



Change of fuel volume in tank

Position and route monitoring

Elena Gurskaya, CKPT Gomel, Technoton's partner

"Gomel railroad transportation company is solving a task of increasing efficiency of machinery operation and minimizing fuel misuse and theft. There was also a need of having real-time information on machinery location within loading and unloading points of the company. It is possible to solve all these tasks by installing only one device to wheel loaders – DUT-E GSM fuel level sensor from Technoton. The "two-in-one" design allowed us on one hand, to reduce time and make less efforts for equipment installation, and on the other, to minimize customer's machinery downtime caused by telematics equipment installation process."

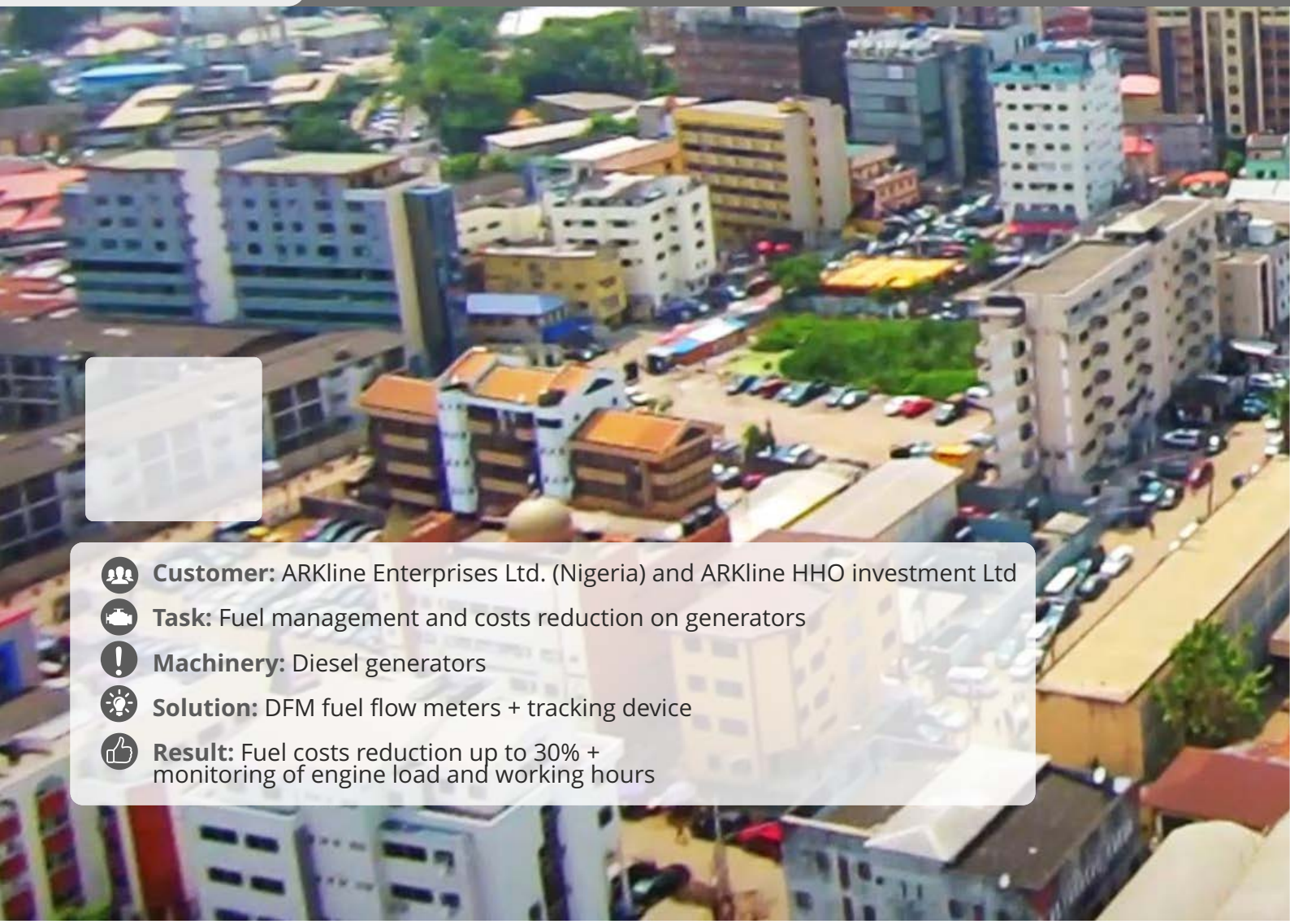
РЕЗУЛЬТАТ

DUT-E GSM fuel level sensors were installed on Amkodor wheel loaders in January 2017. Result – 30% saving of fuel costs, depending on particular vehicle.

The effect is explained by two factors. First, information on vehicle's location and performance displayed by ORF4 telematics service allows accurately determine type of work done by vehicle. Fuel accounting is now based on actual time spent for a particular operation, not on basis of quotas. Second, fuel theft from tank, which previously was a common practice by some employees of the company, became impossible after the installation of DUT-E GSM.

Valeriy Volchkov, Gomel railroad transportation company

"Operating experience has shown that DUT-E GSM fuel level sensor is accurate and reliable tool for fuel monitoring. Data received from the sensor serve as a basis for effective management decisions on fuel economy in our company. Technoton's product works reliably and does not require additional costs for continuous operation. We're planning to equip other tractors and vehicles of our company with DUT-E GSM."



Customer: ARKline Enterprises Ltd. (Nigeria) and ARKline HHO investment Ltd

Task: Fuel management and costs reduction on generators

Machinery: Diesel generators

Solution: DFM fuel flow meters + tracking device

Result: Fuel costs reduction up to 30% + monitoring of engine load and working hours

CUSTOMER

ARKLine provides services in Fuel management to find the best way for a customer to lower fuel costs and increase efficiency. Their customers from bank sphere have large network of generators. ARKLine HHO Nigeria ltd utilizes a CORE Analysis that investigates the issues and probes deeper to uncover base causes within the company. That analysis is centered on the four areas of Revenue, Finance, People and Technology. Company prepare a recommendation to address the critical issues discovered and suggest appropriate solutions and their business impact and the pricing for us to engage our partners.

MACHINERY

CAT diesel generator

Permanent supply of electricity is the basis for bank's uninterrupted operation, guaranteeing timely financial transactions and security of customer deposits. In the electrical network of African countries, there are frequent power outages. Diesel generators are used for backup power supply.

By technical characteristics optimal choice is CAT generators. In the bank field diesel generator power rating 810 kVA (50 Hz, 1500rpm, 400V).

Fuel Consumption:

- ✓ 100% load with fan – 171.7 L/h
- ✓ 75% load with fan – 130.4 L/h
- ✓ 50% load with fan – 90.9 L/h

TASK

Most Nigerian businesses rely on diesel-powered generators because of the poor electricity infrastructure. That is why bank industry has large network of own generators to ensure uninterrupted services to their customers. For bank industry it is essential to stay online when commercial power fails. Keeping an eye on multiple remote generators across a region can get complicated as each generator may start its operation at different times, and consume fuel at different rates.

Fuel monitoring is a huge concern for mobile or stationary generators that are used to provide back-up power. The important task is to monitor generator operation time and its fuel economy.

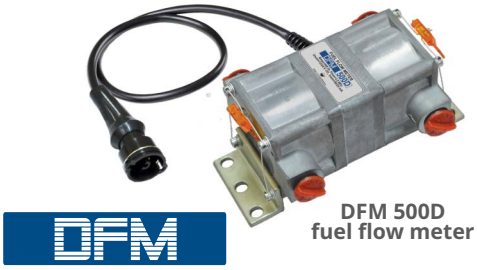
The customer assigns the task to equip generators with remote monitoring system of fuel consumption to be able to get the following information:

- ✓ Generator hours run.
- ✓ Fuel consumption at all engine modes (idling, optimal and full load).
- ✓ Battery voltages.
- ✓ Temperature trends.
- ✓ Power quality and RPMs.

The task is to monitor all this data remotely in real time to reduce maintenance costs and prevent fuel thefts.

РЕШЕНИЕ

DFM fuel flow meters are mounted into engine system to measure total fuel economy, hourly fuel consumption, also engine working hours and fuel temperature. Besides, that total fuel monitoring system give customer possibility to know about generator power, battery voltage and rpm. It is possible to set up email notifications about any rapid changes. In this case differential fuel flow meter was used – DFM 500D with CAN interface.



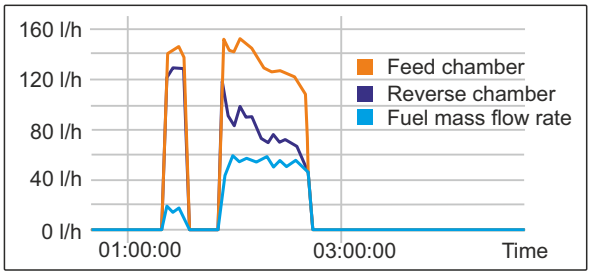
DFM 500D
fuel flow meter

Statistics	
Report	Fuel report (Nigeria)
Report execution time	2017-10-02 03:11:52
Interval beginning	2017-09-25 00:00:00
Interval end	2017-10-01 23:59:59
Time zone	GMT -8:00
Engine hours	30:40:44
Engine hours counter	374:35:35
Unit last location	Oyin Jolayemi Street, Lagos, NG
Last messages time	2017-10-02 03:10:41
Messages	3379
Consumed	1746.39 lt
Average fuel consumption l/h	56.65 lt/h

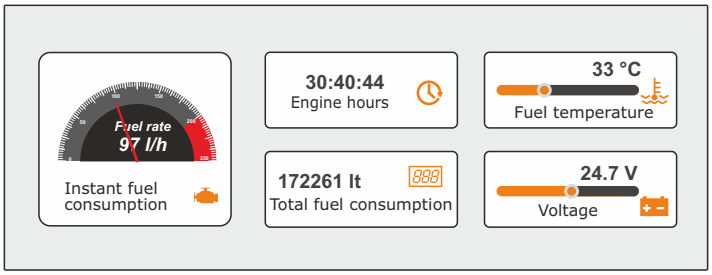
Report "Total Statistics"

Engine hours				
#	Beginning	End	Engine hours	Total consumption
1	2017-09-25 03:18:57	2017-09-25 03:24:56	0:05:59	4.06 lt
2	2017-09-25 03:36:52	2017-09-25 04:27:34	0:50:42	57.18 lt
3	2017-09-25 06:09:00	2017-09-25 06:44:48	0:35:48	41.00 lt
4	2017-09-25 23:48:06	2017-09-26 11:05:19	11:17:13	706.13 lt
5	2017-09-26 14:28:11	2017-09-27 00:06:57	9:38:46	432.16 lt
6	2017-09-27 10:06:35	2017-09-27 11:33:07	1:26:32	88.25 lt
7	2017-09-27 21:14:52	2017-09-27 23:49:59	2:35:07	131.58 lt
8	2017-09-29 06:51:35	2017-09-29 11:02:12	40:50:37	277.51 lt
	2017-09-25 03:18:57	***2017-09-29 11:02:12***	***30:40:44***	***1737.87 lt***

Report "Fuel consumption and Engine hours"



Report in ORF4 telematics service



Report in ORF4 virtual dashboard

DFM 500D CAN allows to get messages remotely for feed and reverse fuel flow rates separately, net fuel consumption of engine and fuel temperature in real time. Also, CAN interface allows to send ready parameters in liters (gallons) that makes 99% accuracy of fuel measurement and display data on server. Each DFM fuel flow meter has option of recording modes of engine operation and performs self-diagnostics to detect interference into system and prevent fuel theft. The following online reports were created for a customer.

Irina Poyankova, Technoton

"We proposed DFM fuel flow meter for generators application because it is easy and high accurate way to monitor fuel consumption. Differential fuel flow meter doesn't require to change engine system, plus CAN interface of the device give much more parameters for a customer than any other digital or impulse flow meters. Generators automatically starts working and it is important to know about exact time of engine running time and fuel consumption during that exact time and location."

RESULT

After DFM fuel flow meters and monitoring system are deployed in generators, customer can control full generator working conditions, fuel economy and fuel theft. It saves money on maintenance costs, optimizes fuel economy up to 30% – up to $1100 monthly.

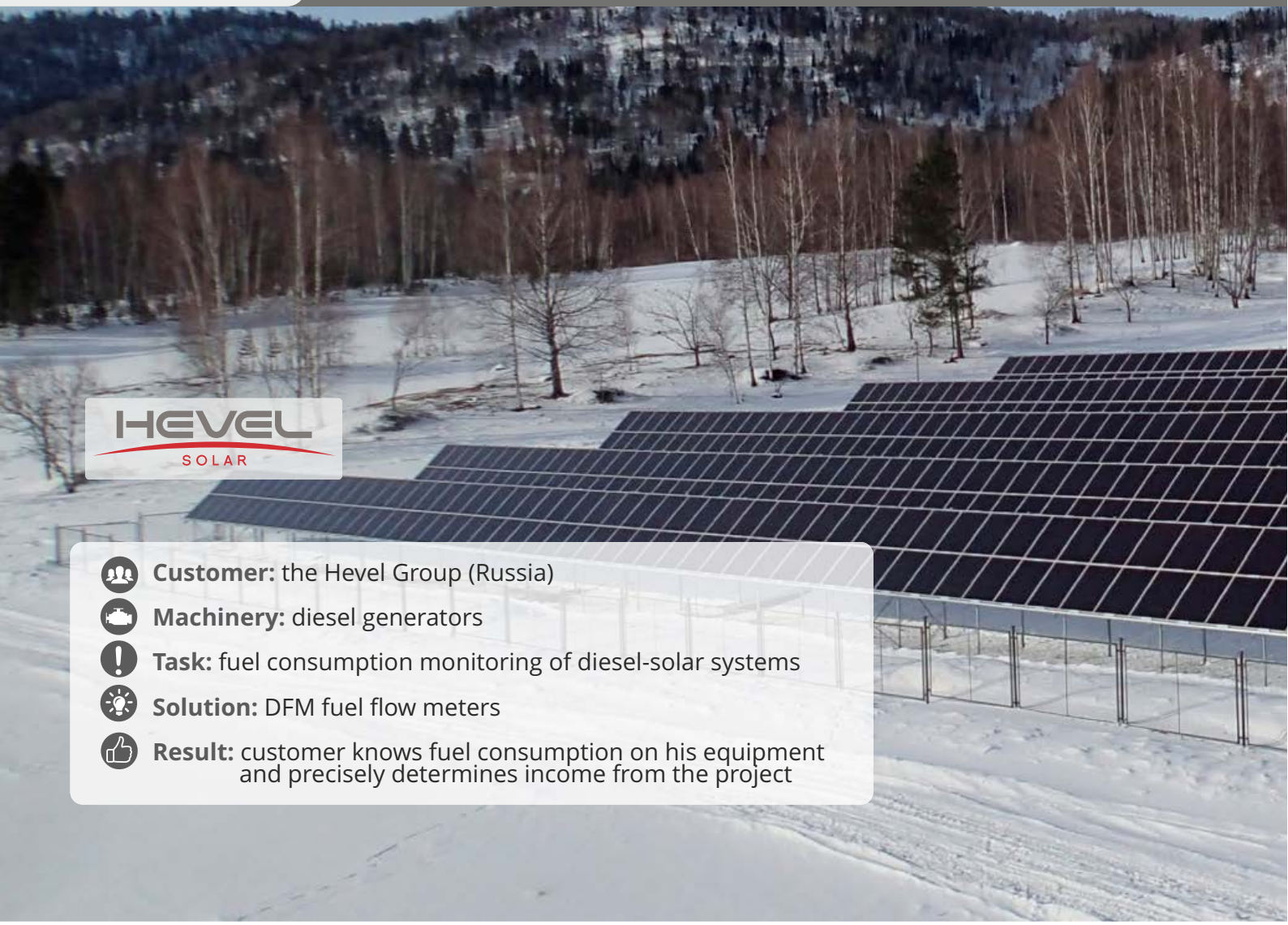
All data is available remotely – it saves time and money whenever it is necessary to get back to generator's location to know about fuel used, load, battery voltage etc.

Real time monitoring of generator performance reduces sudden downtime, overall maintenance cost and fuel consumption. If it falls, timely actions can be taken to bring performance back to acceptable level.

Michael Obiorah, ARKline Enterprises Ltd

"Fuel usage monitoring with inbuilt DFM fuel flow meters allows customer to save good money and take full control of equipment. Reporting on fuel usage and generator's operation in real time via Internet, notifies on generator's malfunctions, draining and refilling of fuel, consumption tampering via SMS and e-mail – all this allows us to set up really profitable solution for a customer."

Hybrid diesel-solar systems, Russia



Customer: the Hevel Group (Russia)

Machinery: diesel generators

Task: fuel consumption monitoring of diesel-solar systems

Solution: DFM fuel flow meters

Result: customer knows fuel consumption on his equipment and precisely determines income from the project

CUSTOMER

The Hevel Group was founded in 2009 and it's Russia's largest integrated solar energy company. The Hevel Group produces solar modules, builds and operates solar power plants and also makes research in the field of solar energy.

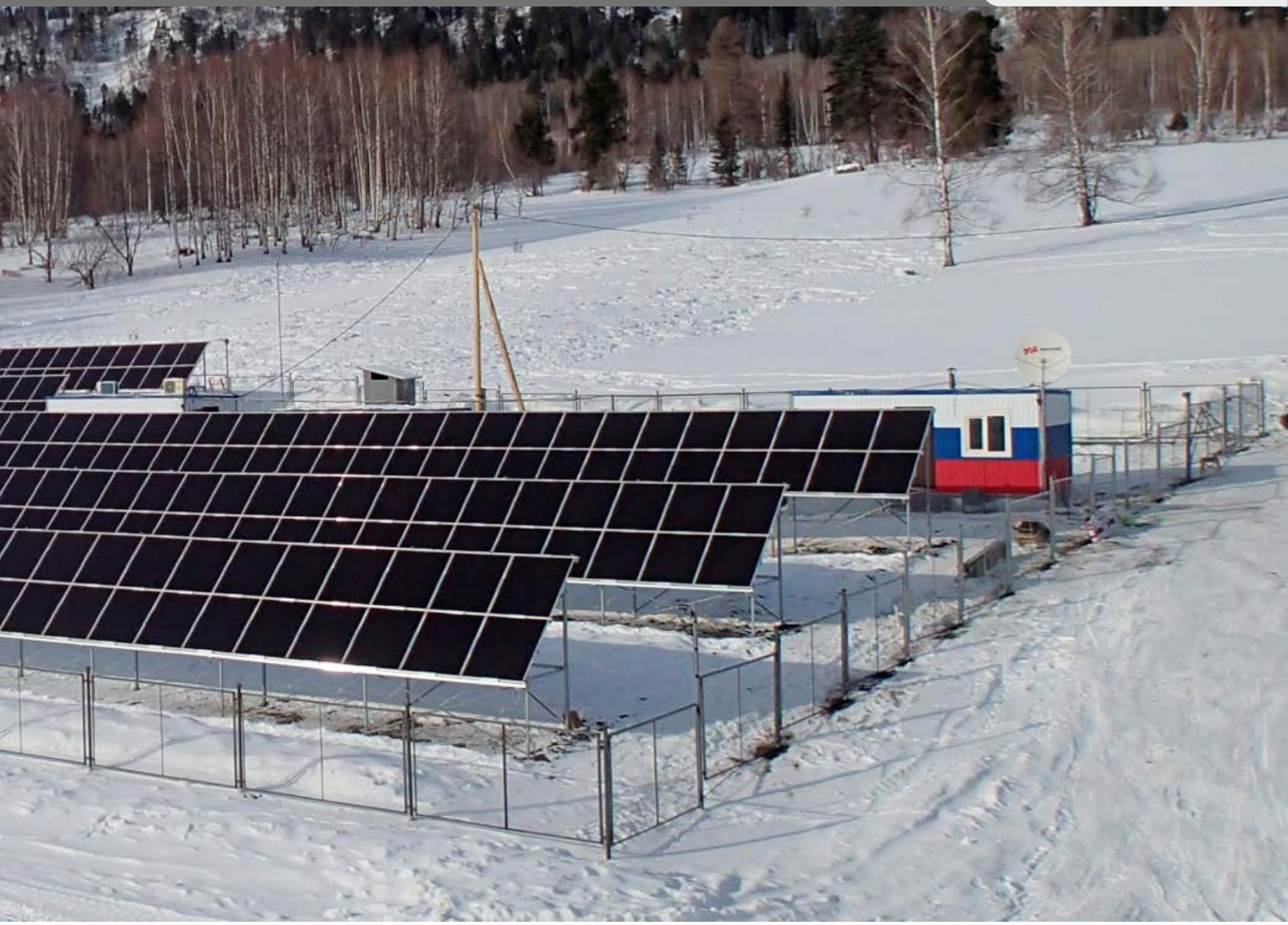
500+ employees

364+ MW total capacity of solar power plants to be commissioned before 2020

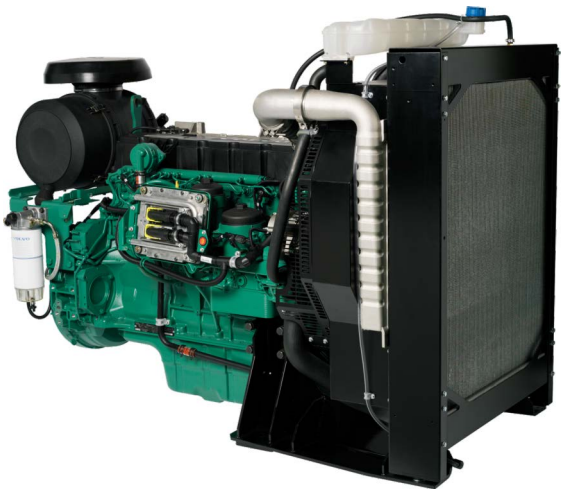
MACHINERY

The autonomous hybrid plant is mounted in Menz village (Transbaikalia territory, Russian Federation). It supplies electrical power to three inaccessible settlements seamlessly.

Plant consists of solar modules with (1) total capacity of 120 kW, two diesel generators (2) of 200 kW each and energy storage (accumulators) (3) with capacity of 300 kW*h. Inverters (4) distribute load between solar cells, diesel generators and accumulators. They also provide batteries charging.



TASK



Volvo Penta TAD734GE engine

Diesel generators are equipped with Volvo Pentà TAD734GE engines with power of 363 h.p. Engine is six-cylinder, working volume – 7,15 L, with in-line arrangement of cylinders and injection system with electronic control of Common rail injectors.

Fuel consumption depends on electric load of engine (from 16 L per hour at load of 25 % to 54 L per hour at full load).

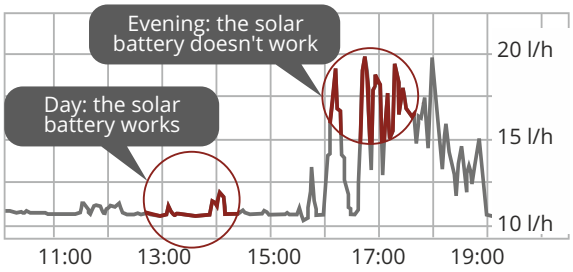
The customer mounted hybrid plant on request of state operator of power networks. The customer's income is determined by energy servicing agreement – the higher fuel economy, the more operator of power networks pays.

Monitoring system, that determines fuel consumption accurately and sends data to customer in real time, is needed to define fuel economy.

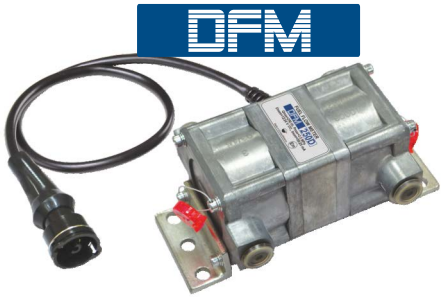
SOLUTION

Fuel consumption monitoring system of autonomous hybrid plants is based on differential fuel flow meter DFM and online telematics unit.

Differential fuel flow meter DFM is mounted into fuel system and measures actual fuel consumption. Its installation doesn't influence fuel flow in the system. The flow meter records operation time of engine in various operation modes and also registers interferences into system.



Fuel consumption in different operation modes



DFM 250D fuel flow meter

Data from the flow meter (instant and total fuel consumption, engine operation time and fuel consumption in idle, optimal and overload modes, fuel temperature) is sent to online telematics unit via RS-485 digital interface. Information from telematics unit is send to dispatch service computer in real time. Data on fuel consumption and engine operation time is available in reports and diagrams.

Victor Panasuk, Technoton

"Technoton produces a wide range of DFM fuel flow meters for all kinds of vehicles.

DFM 250D differential fuel flow meter is optimal solution for Volvo Pentà TAD734GE engine. Its installation takes minimum time and there is no need to modify fuel supply system, because flow meter has two chambers - for fuel supply and fuel returns lines."

RESULT

Taking in account operation experience, the customer is convinced that monitoring system (fuel flow meter and online telematics unit) provides reliable information on fuel consumption and operation time of engine. Financial results of the contract and payments to the customer are evaluated with the help of this information.

The autonomous hybrid plant in Menz village is the first one mounted within the scope of National energy project "Creation of local and integrated in IEA energy supply sources based on new generation photovoltaic heterostructural modules". In total, more than 100 autonomous hybrid power plants will be built until 2021.

All autonomous hybrid power plants will be built and operated under the agreement with state operator of power networks. The Hevel Group plans to mount fuel consumption monitoring systems on all plants within the National project.

Dmitri Saveliev, The Hevel Group

"We decided to mount DFM fuel flow meters designed by Technoton on all our power plants. This was the right decision. DFM performed well on our equipment (diesel generators' engines). Flow meters work accurately and without failures. We plan to continue installation of DFM fuel flow meters on autonomous hybrid power plants."

Smart Power Chile Ltda.

Customer: Smart Power Chile Ltda (Chile)

Machinery: diesel gensets, fuel storages

Task: monitoring fuel consumption and remaining volume in tank

Solution: DUT-E 2Bio fuel level sensors, DFM D fuel flow meters

Result: automated fuel supply from storage to gensets, fuel costs reduced by 15%

CUSTOMER

Smart Power Chile is a company specialized in complex electronic and electric engineering solutions. The company designs and deploys power generation systems fore remote objects. Power generation systems by Smart Power Chile are successfully operated in mines, livestock farms, fishing villages, national parks. After installing and launching the equipment, Smart Power Chile carries out optimization of power generation and diesel fuel use at the object.

Headquarters of the company is located in Santiago. Installations are carried out in Chile, Argentina and other Latin American countries.

ТЕХНИКА

Power generation for remote objects is done by 3-4 diesel generators. All gensets are supplied with fuel from one 30,000-liter stationary storage.

CAT C9 diesel generators are used. Engine – 6 cylinders, volume is 8,8 liters. Electrical power is 230-330 kVA, three-phase current 400V/50 Hz. Fuel injection system – MEUI (Mechanical Electronic Unit Injection), structurally similar to Common Rail. Fuel supply system consists of stationary storage, common fuel line and fuel pumps, which pump fuel out of storage and pump it in fuel tanks of each single diesel generator.

TASK

Smart Power Chile had two interconnected tasks:
1) automate refilling of fuel tanks of generators and exclude human factor;
2) monitor fuel consumption and operation time of diesel generators.

Calculated fuel consumption quota of a genset according to specification is in 43 L/h to 59 L/h range and depends on engine operation mode.

CAT C9 diesel generator

Before installing Technoton's fuel monitoring equipment, fuel consumption was measured and accounted using tables, where engine operation intervals in various workloads were written down manually. High accuracy result was not possible to reach using that method. Thus, it was not possible to get precise numbers on fuel consumption and get accurate fuel volume balance in a tank of a genset.

Fuel pumps, which are refilling fuel tanks of gensets, were turned on manually by an operator. The decision on when to turn on a fuel pump and how long it should work was done by the operator, who was relying on own experience and understanding of current situation at the object. In case of wrong decision, unexpected emptying of fuel tank would lead to genset stop and sudden interruption of power supply to the object.

SOLUTION

Fuel volume in stationary storage is measured by **DUT-E 2Bio fuel level sensor with RS-485 Modbus RTU** interface. The sensor has additional measuring electrode, which allows to measure fuel volume in tank regardless of fuel type inside (mineral diesel or biodiesel) with high precision – inaccuracy is 0,2% while sensitivity of measurement is 0.1mm. Operator can visually follow fuel volume in storage. If fuel is nearly over - the operator sends inquiry for storage refueling.

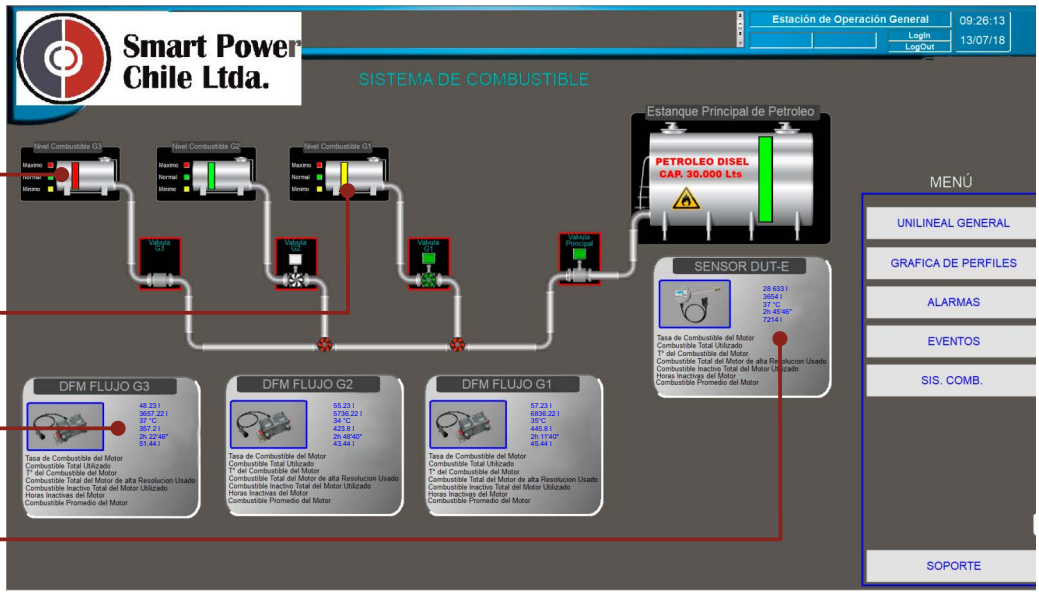
In fuel system of each genset **DFM 500D differential fuel flow meters with RS-485 Modbus RTU** interface are installed. Flow meters send data on instant and total fuel consumption, operation time of gensets' engines in various operation mode – **in total 46 Parameters and Counters**.

Genset's fuel tank indicator red - full tank

Genset's fuel tank indicator yellow - tank is nearly empty, fuel pump will turn on soon

Info from DFM fuel flow meters

Info from DUT-E 2Bio fuel level sensors



Displaying information in SCADA control system.

DUT-E 2Bio fuel level sensor and DFM fuel flow meter are integrated with SCADA. SCADA control system makes calculations on remaining fuel volume in each diesel generator's tank, based on fuel consumption data and operation time of fuel pump. If remaining fuel volume is at its minimum - fuel pumps are automatically turned on. The operator can also monitor remaining fuel volume in each fuel tank on SCADA panel.

Alexandra Cherednichenko, Technoton account manager

"The customer wanted to automate refiling of diesel generators' fuel tanks. Technoton offered the following solution – make automatic calculations in SCADA on the basis of accurate info on fuel consumption of each genset. Fuel is measured by DFM 500D fuel flow meters and DUT-E 2Bio fuel level sensors.
All equipment sends data via RS-485 Modbus RTU protocol. That allowed to carry out easy integration with installed SCADA control system and get detailed information on fuel consumption, fuel temperature and engine operation time in various work modes."

RESULT

Technoton's equipment for fuel monitoring allowed to automate fuel supply from fuel storage to fuel tanks of individual gensets. By exlucing human factor, a risk of genset's engine stop due to empty fuel tank is eliminated. Fuel consumption and operation time in various work modes are also monitored automatically. Gathered information allowed customer to optimize engine operation and reduce fuel costs by 15%.

Tecnoton's products support data transfer using Modbus RTU protocol. That allowed to embed fuel level sensors and fuel flow meters into SCADA control system, which is generally used by Smart Power Chile. No further equipment for signal collection and processing, as well as no additional software for data analysis were needed – that allowes to reduce total price of monitoring system for genset owners.

Victor Hugo Romero, Smart Power Chile power engineer

"Before installing Technoton's equipment, fuel consumption and genset operation time data were gathered and processed manually. Reliability and accuracy of the data were doubtful. DFM fuel flow meters automatically send accurate data on fuel consumption to the database and after that fuel consumption and remaining fuel volume are visualized in SCADA system.
Technoton is the only company, which was able to offer us both fuel flow meters and fuel level sensors sending data over Modbus RTU protocol. We're going to continue installing Technoton's products with Modbus RTU protocol in similar projects."

Partner: Starcom Systems, Israel

Vehicles: MAN, MB, FAW truck tankers

Task: fuel level measurement in cisterns of truck tankers

Solution: DUT-E 2Bio differential fuel level sensors

Result: 60% costs reduction for cargo transportation insurance

PARTNER

Starcom Systems is one of the global leaders in complex telematics projects development and implementation. Starcom Systems solutions cover various fields - road transportation, container shipping by sea and rail, perishable goods transportation, animal farming, healthcare, banking etc. Starcom Systems is traded on London Stock Exchange.

150 distributors

50+ countries of operation

15+ years in telematics

VEHICLES

MAN, MB, FAW truck tankers. They belong to a company from North Africa, which refines crude oil to petroleum products, and delivers products to fuel stations and fuel storage units of road builders. In the same compartment of cistern different fuel types can be transported depending on the day: diesel, gasoline, kerosene.

Totally over 1000 truck tankers of various design are involved in fuel transportation: three-axle vehicles with cistern, two-axle freight trucks with three-axle semi-trailer, three-axle vehicles with cistern and a second one on the trailer. Total volume of oil products, that are carried is from 15 to 45 cubic meters.

TASK

Fuel is transported over long distances: from 100 to 1000 km. But it often happens that some part of fuel is not delivered to the endpoint. Unfortunately, some roguish drivers steal fuel by discharging high-quality fuel and by adding extraneous liquids to fuel in the tank or fill the tank with various illegal liquids to keep fuel theft hidden. Actions like that directly cause loses to fleet owner and entail reputation risks.

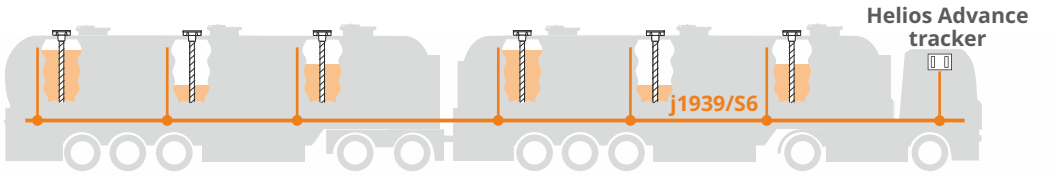
Transportation company has to provide cargo insurance, because there is no opportunity to ensure high-level cargo security while shipping. But the problem is that insurance companies set out so high prices, so that it strongly lowers profitability of transportation.

Fuel tank monitoring allows reducing risks of fuel theft when freighting. The system notifies on fuel draining and fuel replacement in cistern in real-time, thus ensuring fuel theft prevention. So much the more insurance companies are ready to lower prices by several times for vehicles, equipped with fuel tank monitoring system.

SOLUTION

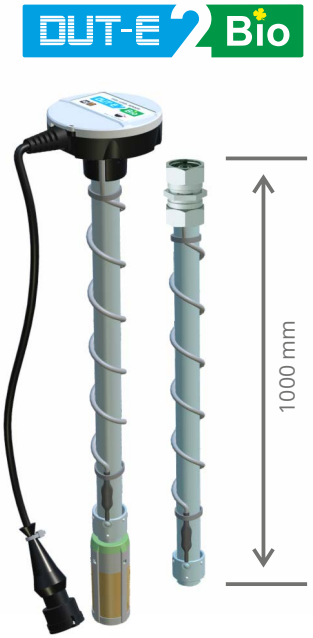
DUT-E 2Bio fuel level sensor provides high accuracy of fuel volume measurement no matter what fuel type is. In case fuel tank was filled with gasoline instead of diesel fuel, measurement inaccuracy won't get higher than 1%. That means, that you don't have to re-calibrate sensors, make changes to fuel tank table and carry out additional adjustment of the telematics unit anymore. Messages on fuel type/quality change are sent to the tracker, which notifies fleet manager of this Event via e-mail or SMS. The efforts of roguish drivers to steal or change fuel won't go unnoticed.

DUT-E 2Bio differential fuel level sensor is installed in each compartment of a cistern. The height of cisterns varies from 1500 to 2000 mm. To reduce transportation costs DUT-E 2Bio is supplied with 1000mm length and with additional sections 500 and 1000mm. **Adjustment of DUT-E 2Bio probe length occurs in few minutes during sensor installation.**



Fuel level sensors DUT-E 2Bio in truck tanker and trailer compartments

The number of compartments can reach six on truck tankers with trailers. That's why DUT-E 2Bio fuel level sensors with CAN j1939/S6 interface, based on S6 Technology are used. All sensors together with Helios Advance tracker are united in a single network with power supply and configuration of hardware from one point. Each sensor has a unique address in the network. This provides an opportunity to see both the total volume of fuel in the fuel tanker and trailer, and also level, volume and temperature of fuel in each compartment.



Differential fuel level sensor and additional section

Gregory Voleiko, Technoton Head of Sales Departments

"The main goal of the project – to exclude illegal fuel draining and replacement of fuel with cheaper liquids in a cistern. Third measuring electrode of DUT-E 2Bio detects fuel types by predefined pattern, measures fuel level and volume in each compartment of cistern, and sends alarms on fuel drain/change. Core features of DUT-E 2Bio:

- *possibility of length cutting/extension of measuring tube - savings on delivery to the installation site;*
- *S6 Technology – easy mounting and configuration, possibility to create a network of several sensors connected to one CAN-port of telematics device."*

RESULT

DUT-E 2 Bio fuel level sensors were installed to more than 1,000 fuel trucks. Totally 2,200 sensors were mounted over a short period since March 2019, so that carrier didn't incur costs caused by vehicle idling. Due to the simplicity of a truck tanker fuel monitoring system, based on S6 Technology and Helios tracker with CAN interface, the total costs of the project was not high. Now fuel level sensors have already proven their quality and have shown high accuracy of measurement and reliability. As a result, a shipper has decided to equip all the new truck tankers with fuel tank monitoring system, based on DUT-E 2Bio and Helios Advance tracker.

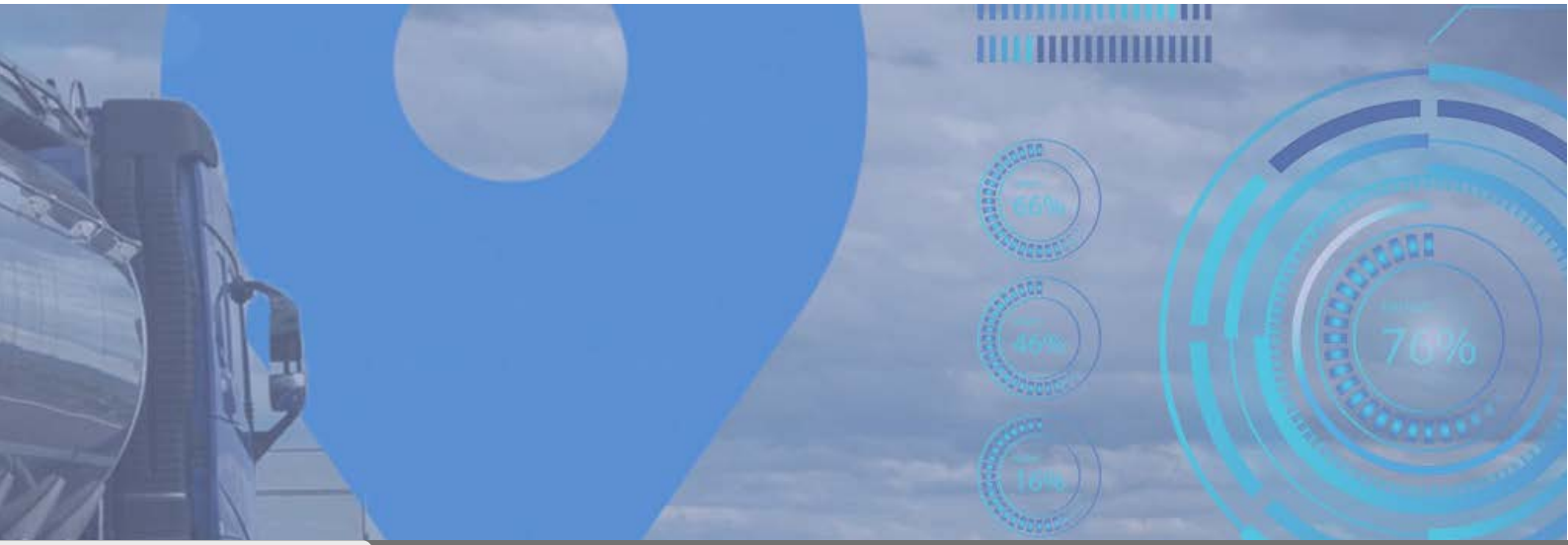
Effects of implementing telematics system:

1) 60% costs reduction for cargo transportation insurance;
2) fuel drain volume reduction by more than 2 times;
3) excluded illegal fuel change.

Isaac Maina, Starcom Systems Regional Manager

"Main benefits of DUT-E 2Bio, which were highly appreciated by Starcom Systems:

- *Unique functionality. The sensor accurately measures fuel level and volume of any fuel type in the tank or cistern. Today truck tankers carry diesel fuel, tomorrow - gasoline, the day after tomorrow - kerosene - and inaccuracy is not more than 1%.*
- *Quick and easy installation. Probe length of DUT-E 2 Bio is easily adjusted – there is no necessity to measure height of cistern compartments beforehand. Thus, installation time is saved.*
- *Technical training for our installers conducted in Minsk by Technoton, detailed technical documentation."*



Stationary fuel tanks, Yemen

Customer: WFP Yemen office

Object: stationary fuel tanks/ fuel cisterns

Task: fuel volume monitoring

Solution: DUT-E 2Bio fuel level sensors

Result: underfilling of fuel stopped, uninterrupted feed of genset ensured, fuel expenses decreased by 25%

CUSTOMER

The United Nations World Food Program (WFP) is the world's largest humanitarian organization. A key area of work is providing food and medical aid to residents of countries, that are experiencing wars, natural disasters and crop failures.

Large **WFP office is open in Yemen** – where a civil war has been going on for several years.

97 million people in **88** countries receive medical aid

15 000 full-time employees

OBJECT


Fuel from fuel cisterns feeds genset (➡)

WFP offers medical care to the population in hundreds of hospitals throughout Yemen. Sustainable energy supply of hospitals is provided by diesel generator sets.

Stationary cisterns of various shapes and sizes are installed to supply gensets with fuel. Height of fuel tanks is from 1000 mm to 4000 mm, volume – from 800 l to 48 000 l.

TASK

To provide uninterrupted feed, from 3 to 6 fuel tanks are necessary

WFP purchases diesel fuel for hospitals from a local provider, who brings fuel on his own and carries out fuel tank refuelling. Customer receives an invoice and delivery note with data on the amount of fuel filled up. But the staff of WFP office cannot verify in any way how accurate this data is.

For several months, electrical supply for a hospital was regularly endangered. The customer was starting to get suspicious that fuel provider is supplying less fuel than specified in documents.

An uninterrupted electricity supply is critically important for operation of hospitals. A total power outage even for a few minutes could lead to grave consequences – surgical operations will be interrupted, life support equipment, connected to emergency patients, will turn off.

WFP office faced necessity of implementing **online monitoring of fuel refilling volume** in each stationary fuel tank, as well as monitoring of total fuel volume in several cisterns, that provide gensets with power.

SOLUTION

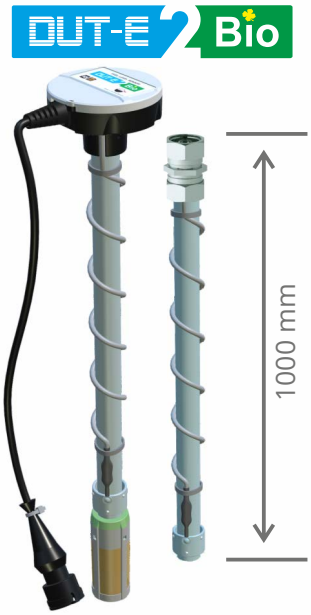
To solve the problem of fuel monitoring, customer turned to telematics system provider – Universal Yemen for Logistic Support and Construction Ltd (ULC). ULC company offered Technoton's fuel monitoring system based on DUT-E 2Bio differential fuel level sensors and CANUp telematics gateways.

DUT-E 2Bio sensors (➡) and S6 cable system (➡)

Quality of supplied fuel is unstable: permittivity value changes depending on delivery. DUT-E 2Bio fuel sensor measures real fuel volume in cisterns/stationary fuel tanks with high accuracy. The third electrode, placed at the bottom of fuel tank, identifies change in permittivity of fuel. **When a new portion of fuel of any volume is added to fuel tank/cistern, fuel sensor automatically corrects result of measurement.** However, measurement inaccuracy not more than ± 1%.

To reduce transportation costs, sensors are supplied with a length of 1000 mm and with additional sections of 500 or 1000 mm. During mounting, installer extends measuring part of sensor to required length in a few minutes.

The number of cisterns, that supply genset with fuel, is from three to six. DUT-E 2Bio sensors with CAN j1939/S6 interface and S6 Technology are installed on them. All sensors and CANUp telematics gateway are combined into a single network with a common power supply.



Differential fuel level sensor and additional section

Emad Mohammed, ULC project manager

"DUT-E 2Bio differential fuel level sensors were chosen as the best tools for solving task of our customer. At first, sensors measure fuel level with high accuracy and allow remotely monitoring of fuel quality. In case, a new delivery of fuel differs in permittivity value from the previous one, customer receives online notification. Secondly, devices are easy to mount - they can be extended with additional sections to required length. Thirdly, S6 Technology allows quick connecting to a single network and configuration of sensors and CANUp telematics gateway. All necessary information is transmitted to ORF4 telematics service."

РЕЗУЛЬТАТ

Customer receives data on fuel volume in each stationary fuel tank in real-time. Accuracy of fuel volume measurement does not depend on fuel quality/temperature. Even when adding a small amount of fuel, DUT-E 2Bio detects change in fuel level with a pitch of 0.1 mm.

After telematics system installation, customer can monitor real volume of fuel filled up and verify it with data specified in waybill.

Underfilling of fuel by provider have been stopped, thus, fuel expenses for genset decreased by 25%. Uninterrupted feed of diesel generator set was ensured.

Ali Haqlan, WFP engineer

"At the first stage of the project, 149 items of DUT-E 2Bio differential sensors were installed. Now sensors provide reliable information on fuel volume in each cistern. Once installed, the risk of power outages in hospitals is reduced to zero. Within next months, another 606 sensors are going to be mounted. Ultimately, telematics by Technoton will be installed on 755 stationary fuel tanks, which provide 193 diesel generators with fuel. "