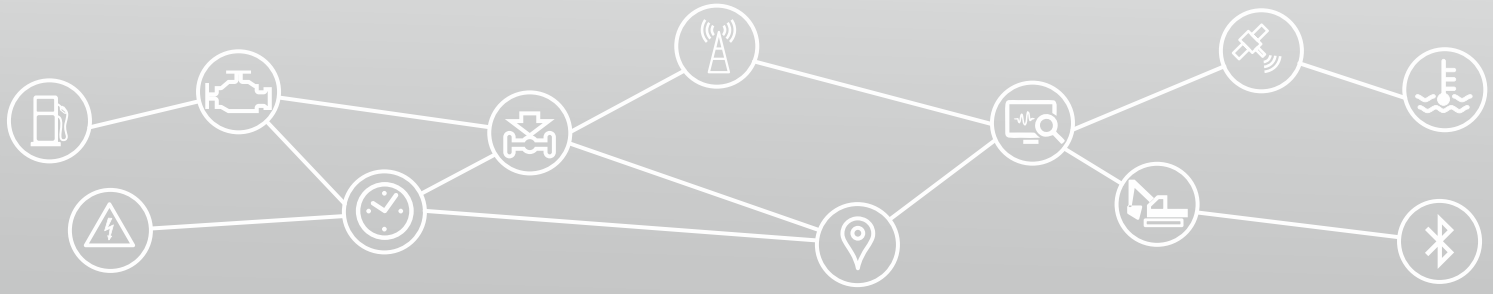
TECHNOTON




ADVANCED MACHINERY TELEMATICS

TASKS PRODUCTS SOLUTIONS PROJECTS






Facts and figures

- Over **20 years** in telematics and fuel monitoring markets
- **500+ integration partners** in 140+ countries.
- **20+ official dealers and distributors** in the EU and CIS countries.
- **137 employees** in all divisions.
- R&D: team of **25 HW & SW developers and technical designers** are working on innovative telematics products.
- **3 production facilities:** precise mechanics, electronics, pilot production.
- Quality assurance system is certified in **ISO 9001** by DakkS.
- Technical support team of **7 engineers**.

Our mission

We develop intelligent telematics technologies so that owners of mobile and stationary machinery have detailed and accurate information about the operation of equipment and see ways of optimizing operating costs.

Our pillars

Our customer groups

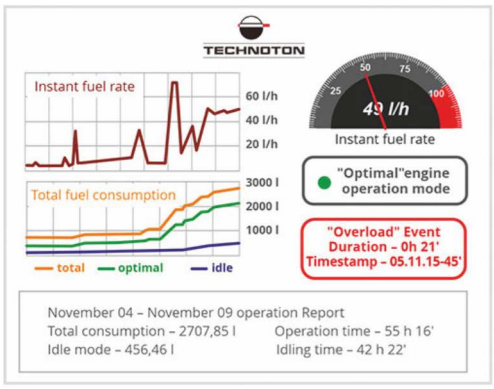
- ✓ telematics system providers;
- ✓ big machinery fleets;
- ✓ machinery manufacturers;
- ✓ machinery servicing companies;
- ✓ manufacturers of telematics equipment: GPS trackers, gateways, sensors;
- ✓ IoT equipment integrators.

Major customers

NEW HOLLAND SOCAR ZF WABCO BOSCH

Tasks solved

Fuel consumption monitoring



Subtasks solved:
- ✓ optimizing machinery operation modes;
- ✓ recalculation of fuel consumption quotas;
- ✓ fuel theft prevention;
- ✓ introducing of maintenance prediction approach.

What's monitored:
- ✓ actual fuel consumption in engine fuel lines;
- ✓ engine workload mode by fuel rate;
- ✓ fuel level change in tank, fill-up and draining volumes.

Benefits from implementing:
- ✓ higher fuel economy;
- ✓ extended machinery lifetime;
- ✓ optimized repair and maintenance costs.

Operation hours registration

Mode of work	Time of work
All modes	55h 16' 33"
Idling	2h 35' 48"
Optimal	42h 22' 01"
Overload	0h 22' 01"
Tampering	0h 02' 45"
Interference	0h 01' 07"

Subtasks solved:
- ✓ optimizing machinery operation schedule;
- ✓ supervising operator's working hours;
- ✓ excluding consequences of exceeding shift duration;
- ✓ reducing machine downtime;
- ✓ introducing of maintenance prediction approach.

What's monitored:
- ✓ real engine operation hours;
- ✓ Operation hourssplit by “Idling”, “Optimal” and “Overload” engine modes;
- ✓ fuel consumption split by engine workload mode.

Benefits from implementing:
- ✓ fair performance-based salary system;
- ✓ fuel costs saving by eliminating downtime;
- ✓ optimized repair and maintenance costs.

Tasks solved

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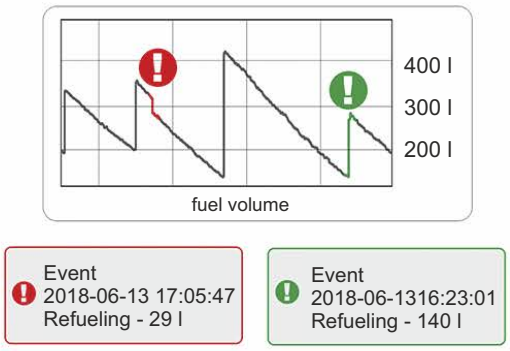
Fuel tank monitoring



Subtasks solved:
- ✓ accurate data on fuel residue in tank;
- ✓ measuring exact fuel tank fill up volumes;
- ✓ detecting fuel draining attempts;
- ✓ determining fuel consumption by level change;
- ✓ excluding frauds with fuel mixing.

What's monitored:
- ✓ remaining fuel level and volume in tank;
- ✓ place and time of fuel tank fill-up;
- ✓ alarms on fuel siphoning from tank;
- ✓ change of fuel quality and type in tank.

Benefits from implementing:
- ✓ higher fuel economy;
- ✓ reduced fuel system maintenance costs.

GPS position and route tracking

Subtasks solved:
- ✓ recording mileage, trip time;
- ✓ optimizing route;
- ✓ monitoring driving behavior.

What's monitored:
- ✓ GPS coordinates, route, speed, traveled distance, accelerations, braking, harsh turns etc.
- ✓ Entering/leaving geofences;
- ✓ durations and places of stops.

Benefits from implementing:
- ✓ optimized fuel economy;
- ✓ reduced vehicle wear-out;
- ✓ improved road safety.

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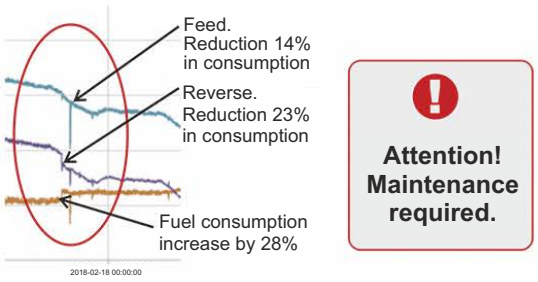
Tasks solved

Predictive maintenance approach



Attention! Maintenance required.

Subtasks solved:
- ✓ monitoring fuel system condition;
- ✓ detecting malfunctions of engine and assemblies;
- ✓ improving maintenance activities schedule.

What's monitored:
- ✓ fuel system: changes of fuel rate, total fuel used, total operation time, operation modes;
- ✓ ECUs and assemblies: DTCs, abnormal change of operation parameters.

Benefits from implementing:
- ✓ reduced repair costs and avoided breakdowns;
- ✓ extended machinery lifetime;
- ✓ improved safety of operations.

Remote control of machine units

Subtasks solved:
- ✓ immobilizing engine to prevent launch;
- ✓ emergency shutdown of machine unit;
- ✓ remote start/stop of genset, burner, boiler and other objects.

What's monitored:
- ✓ location of machinery unit;
- ✓ data from standard and additional sensors;
- ✓ data from CAN bus or other information buses of vehicle or stationary object.

Benefits from implementing:
- ✓ prevention of vehicle theft;
- ✓ online management of remote objects.

Tasks solved

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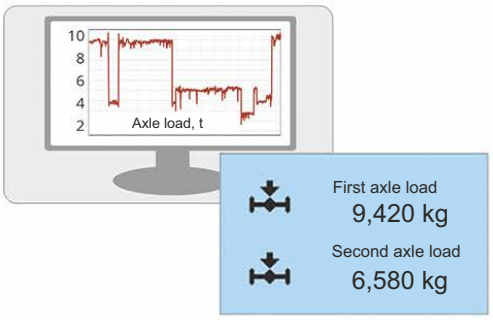
Axle load monitoring

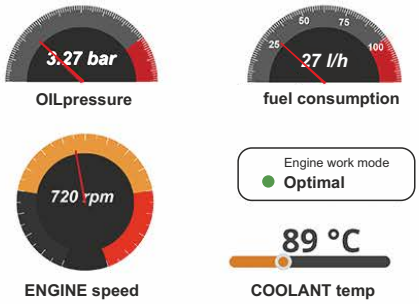


Subtasks solved:
- ✓ live monitoring of axle weight;
- ✓ preventing vehicle overload;
- ✓ tracking places of loading/unloading.

What's monitored:
- ✓ axle load from additional sensors and/or axle weight data from CAN bus;
- ✓ GPS position of vehicle.

Benefits from implementing:
- ✓ optimized vehicle load;
- ✓ avoided axle overload fines;
- ✓ reduced costs for suspension maintenance;
- ✓ preventing transportation of "unauthorized" cargo.

Monitoring auxiliary equipment and attachments

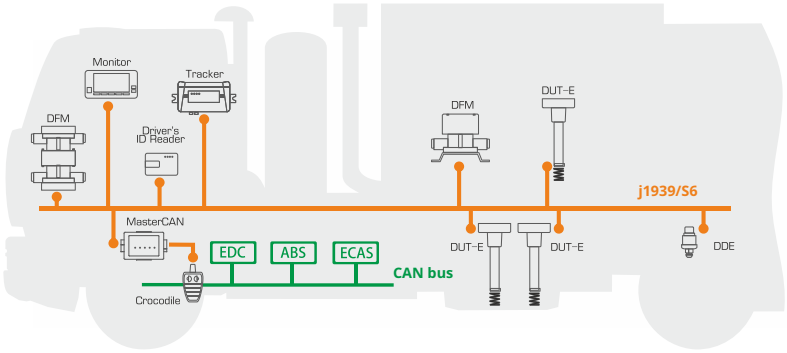


Subtasks solved:
- ✓ tracking quality of operation;
- ✓ detecting idling operation;
- ✓ improving maintenance schedule.

What's monitored:
- ✓ temperature, pressure and other operation parameters using CAN bus data and information from additional sensors of telematics system.

Benefits from implementing:
- ✓ higher transparency of operational costs;
- ✓ improved fuel economy;
- ✓ reduced maintenance costs.

S6 – Technology of creating a wired network of telematics devices



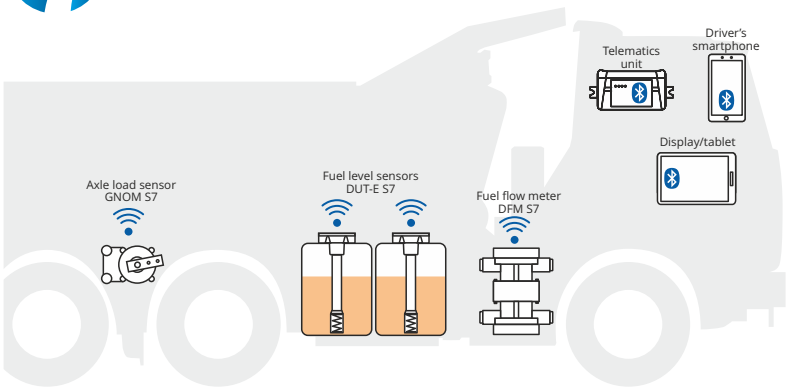
S6 Technology is based on CAN 2.0B standard and allows combining standard and additional sensors and machinery's CAN J1939 bus in a single wired network, and integrating data into a telematics system.

S6 Technology is used on machinery, where wide set of onboard telematics equipment is used. The Technology helps to increase reliability of data transfer, ease connection process and ensure 100% compatibility of devices.

Core elements:

- ✓ Database – 10,000+ unified parameters described by SAE CAN J1939/71 and ISOBUS (ISO 11783) standards.
- ✓ Units – compatible sensors, meters, converters, trackers and other on-board devices.
- ✓ Cabling system – set of elements with standardized connectors. Allows quick connection of devices, configuration and power supply from one point for all devices within network.

S7 Technology – wireless data gathering over BLE



S7 – Technology of wireless data gathering from autonomous sensors used in telematics systems for vehicles and stationary equipment.

S7 Technology uses BLE (Bluetooth Low Energy) for data transfer to telematics units and smartphones. BLE ensures ultra-low energy use and allows long operating time of an autonomous device.

Advantages of using S7 Technology:

- ✓ Wireless – quicker and easier installation of devices, zero risk of cable damage.
- ✓ Embedded battery – no need of external power supply, explosion- and fire-safety of devices.
- ✓ "BLE-radio" operation mode – allows data transfer to several receivers, zero risk of unpairing (disconnection).

IoT Burger – Technology for data processing "on board" of IoT device

Example of functional modules

- Power manager
- Clocks
- Passport
- Authorization
- Self-diagnostics
- Measuring channels
- Analytics
- Report Generator
- Report Registrar
- Internet-communicator

IoT Burger Technology recognizes quick changes of machinery operation parameters, validates and processes raw data "on board" (inside a device) and generates User Reports containing ready-for-use information.

Devices built on IoT Burger Technology are composed of standardized elements – Functional Modules (FM). FM represents hardware-software part of a device, carrying out a set of features.

Advantages of implementing IoT Burger in devices for telematics:

- ✓ Allows detecting quick changes (<1s) of parameters, e.g. important for diagnostics
- ✓ Reduces telematics server load and optimizes databases' size.
- ✓ Allows using IoT devices in area with poor GSM coverage.
- ✓ Provides opportunities of quick device customization or development of new devices (for companies who develops new equipment for telematics of vehicle and stationary objects).

Technical support

Technical support

Assistance to our customers with selecting proper product and configuring it for a specific machine.

Support is carried out in English, Spanish and Russian.

Technical training

We train installation technicians in installing and configuring our products.

The training includes theoretical part and practice in installation on real vehicle.

After completing test, installation technicians get certificate, which officially confirms qualification.

Installation supervision

Our support engineers can come to your location, make example installation, explain theory behind and guide your technicians through the whole process, so they can work with our products later without assistance.

Online training

Our support engineers can come to your location, make example installation, explain theory behind and guide your technicians through the whole process, so they can work with our products later without assistance.

Integration

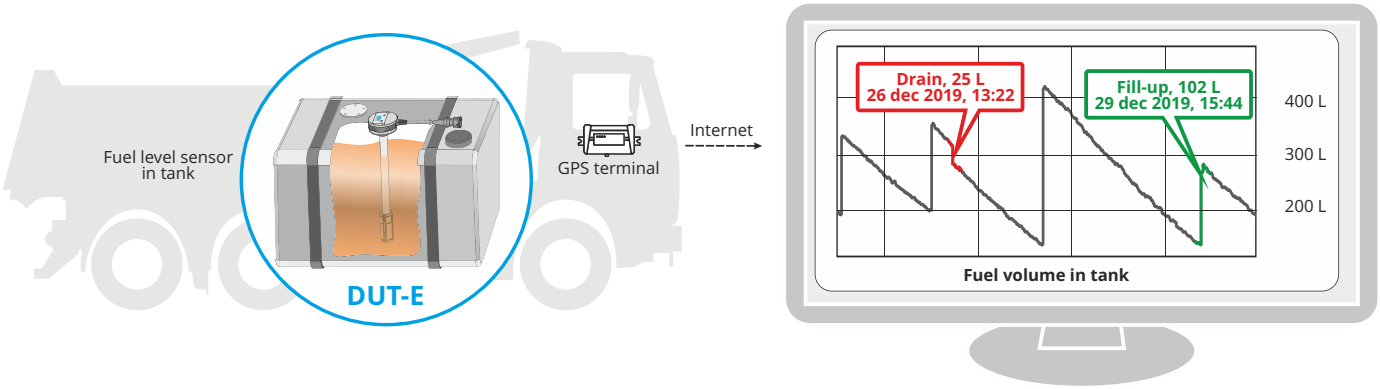
We are constantly expanding the list of compatibility of our products with telematics units and GPS trackers of other manufacturers – all that to provide maximum flexibility for our integration partners and telematics system providers.

DUT-E

DUT-E fuel level sensor – accurate tool for fuel tank monitoring

DUT-E is a product line of fuel level sensors used within telematics systems or as a replacement for standard fuel sensor of vehicle or stationary tank.

The product line includes: DUT-E (classical capacitive sensor), DUT-E 2Bio (differential sensor), DUT-E GSM (built-in GSM and GPS modules), DUT-E S7 (fully autonomous, built-in battery and BLE connectivity).

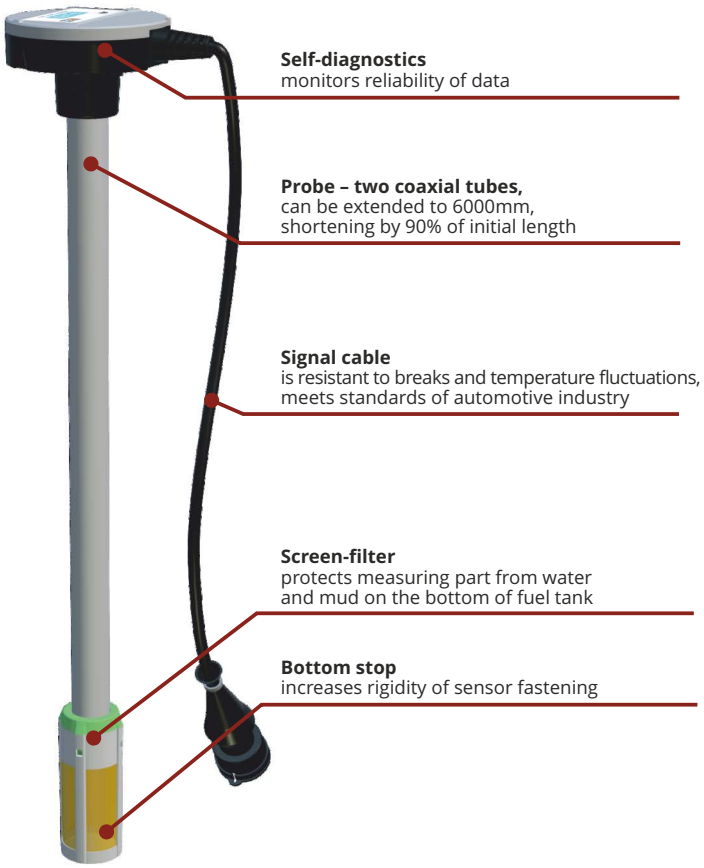


Purpose of use

- ✓ Monitoring fuel residue in tank;
- ✓ measuring volumes of tank filling-up and draining;
- ✓ preventing fuel theft from tank;
- ✓ indirect fuel consumption measurement.

Monitored parameters

- ✓ Fuel volume in tank – in liters or % of total;
- ✓ fuel level – in millimeters;
- ✓ fuel volume in several tanks – total and separately;
- ✓ temperature;
- ✓ voltage of on-board network of vehicle.



Output signal

CAN – CAN j1939/S6 interface
AF – voltage/frequency 1.0-9.0 V / 500-1500 Hz
I – current 4-20 mA
232 – RS-232 interface, Modbus RTU or DUT-E COM (LLS extended) protocol
485 – RS-485 interface, Modbus RTU or DUT-E COM (LLS extended) protocol
GSM – 2G or 2G/3G GSM standard, Wialon IPS v2.0 or MQTT IBM Watson IoT protocol
S7 – Bluetooth Low Energy (BLE, Bluetooth 4.X)

Specifications

Sensitivity to fuel level change	0,1 mm
Power supply voltage range	10–50 V
Temperature range	from -40 to +85 °C
Protection against conductive interference	to 700 V

Certificates

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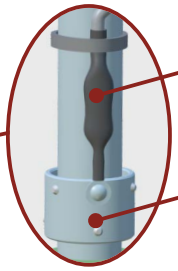
DUT-E 2Bio – accurate measurement of various fuel types

DUT-E 2Bio is a differential fuel level sensor, which provides high accuracy fuel volume measurement regardless of fuel type inside a tank.

The sensor automatically detects change in fuel permittivity and adjusts measurement results.

No need of recalibrating sensors, adjusting configurations, or creating new tank calibration table when different fuel type is being filled in a tank.



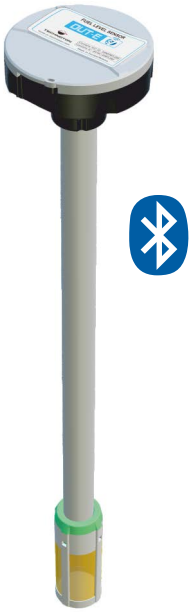
DUT-E GSM – two in one: fuel level sensor + telematics unit

Measures fuel level and volume in tank, tracks position over GPS/GLONASS and sends data to user's phone number, email and to a telematics server over 2G and 3G:

- ✓ vehicle/object position;
- ✓ speed, acceleration, and direction of movement;
- ✓ level and volume of fuel in tank or several tanks;
- ✓ fuel and ambient temperature;
- ✓ voltage of vehicle's onboard network.

DUT-E GSM automatically generates reports according to configured schedule or upon detected events, e.g. “Tank fill-up” or “Fuel draining”.

DUT-E S7 – fully autonomous BLE sensor. DUT-E S7 operates in “BLE-radio” mode – the sensor sends data to all nearby devices without pairing



- ✓ Quick installation without spending time for cabling;
- ✓ certified for explosion- and fire-safety;
- ✓ BLE-radio mode – advertising data to several receivers simultaneously;
- ✓ embedded battery allows sensor operation without external power;
- ✓ smartphone app for fuel volume monitoring and alerting fuel theft (“night watch”).

Specifications

Wireless data transfer interface	Bluetooth 4.1
Lifetime of battery	at least 5 years
Signal transmission range on the line of sight	100 m
Signal transmission range on a vehicle	15 m

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Fuel flow meters and counters

DFM

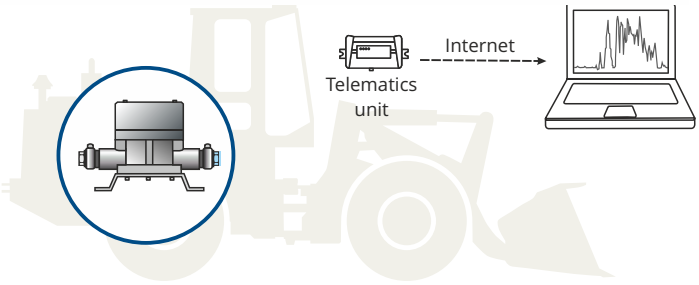
DFM S7

DFM – direct measurement of engine fuel consumption

Flow meters are used as a part of telematics system or as a stand-alone solution for monitoring engine fuel consumption and engine operation time.

Purpose of use

- ✓ Monitoring of real fuel consumption;
- ✓ preventing fuel theft;
- ✓ fuel consumption optimization;
- ✓ machine hours accounting.



Exceptional features

- ✓ Inbuilt battery – data recording without external power supply;
- ✓ metrological verification of each flow meter;
- ✓ thermal correction feature;
- ✓ anti-cheating protection;
- ✓ event recognition – high/low level of supply voltage, cheating (tampering), interference time into operation of flow meter's.

Parameters and Counters

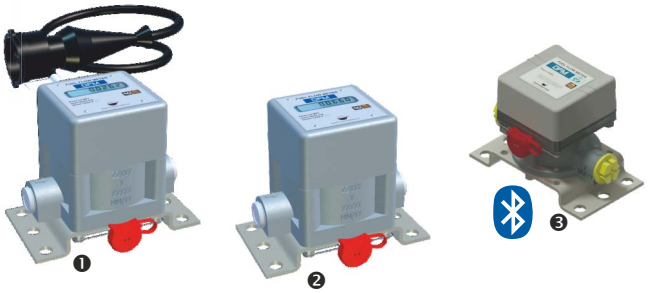
- ✓ hourly fuel consumption rate, operation by fuel rate;
- ✓ total fuel consumption and engine operation time;
- ✓ fuel consumption and engine operation time in "Idle", "Optimal", "Overload" modes;
- ✓ fuel consumption and operation time in "Tampering" mode;
- ✓ operation time in "Interference" mode.

Output signal

C – autonomous - no signal
K – normalized pulse
CAN – interface CAN (SAE j1939, S6, NMEA 2000)
232 – interface RS-232 (DFM COM, Modbus RTU)
485 – interface RS-485 (DFM COM, Modbus RTU)
S7 – wireless data transfer interface Bluetooth Low Energy (4.1 and up)

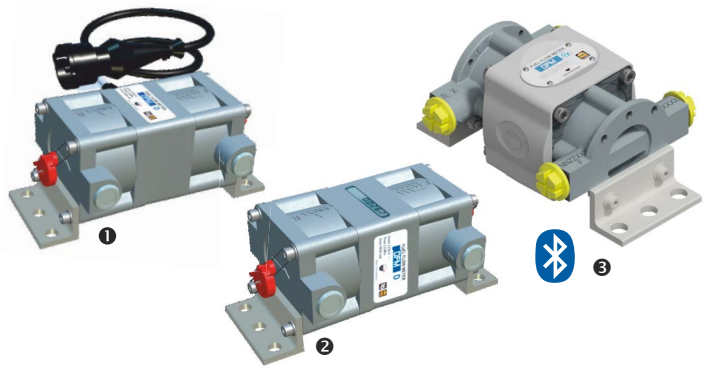
Specification

Relative accuracy error, one-chamber/differential	1 / 1–3 %
Liquid kinematic viscosity	1.5–6.0 mm^2/s
Supply voltage	10–50 V
Operating temperature	–40 ... +85 °C
MAX pressure	25 bar
For wireless DFM S7:	
Lifetime of battery	At least 5 years
Signal transmission range on the line of sight	45 m
Signal transmission range on a vehicle	5 m



One-chamber DFM fuel flow meters:
❶ with output cable, ❷ autonomous, ❸ wireless (Bluetooth)

Models	One-chamber, l/h	
	MIN fuel rate	MAX fuel rate
DFM 50	1	50
DFM 100	2	100
DFM 250	5	250/350*
DFM 500	10	500/600*



Differential DFM D fuel flow meters:
❶ with output cable, ❷ autonomous, ❸ wireless (Bluetooth)

Models	Differential, in each chamber, l/h	
	MIN fuel rate	MAX fuel rate
DFM 100D	10	100
DFM 250D	50	250/300*
DFM 500D	100	500/600*

* HP– high performance version, increased MAX fuel rate

Certificates

Fuel flow meters and counters

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DFM Marine – direct measurement of heavy machinery fuel consumption

DFM Marine fuel flow meters:
❶ with output cable, ❷ autonomous, ❸ wireless (Bluetooth)

Specification

Relative accuracy error	0,5 %
Liquid kinematic viscosity	1,5–6,0 mm²/s
Supply voltage	10–50 V
Operating temperature	–20 ... +80 °C
MAX pressure, thread/flange	16/25 bar
Body material	brass or duralumin
Measuring chamber material	brass
For wireless DFM Marine S7:	
Lifetime of battery	At least 5 years
Signal transmission range on the line of sight	45 m
Signal transmission range on a vehicle	5 m

Models	MIN fuel rate l/h	MAX fuel rate l/h
DFM Marine 1000	20	1000
DFM Marine 2000	40	2000
DFM Marine 4000	80	4000

S7 NMEA data converter – data integration from DFM S7/DFM Marine S7 wireless fuel flow meters into NMEA 2000 vessel's bus

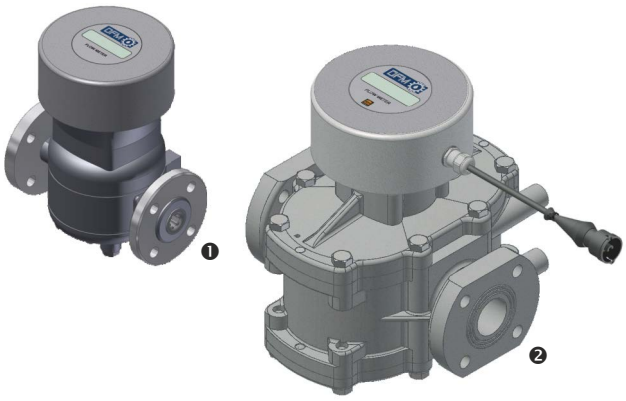
- ✓ Data receiving from one fuel flow meter or a pair of fuel flow meters via Bluetooth.
- ✓ Automatic calculation of consumption difference (differential consumption) from a pair of fuel flow meters. Any two flow meters can operate in pairs without mutual selection and calibrations.
- ✓ Service S7 NMEA mobile application (available in the Play Market) for operating modes setting.

Specification

Input interface	Bluetooth 4.2 and above
Output interface	NMEA 2000
Signal receiving rang from flow meter	Up to 50 m
Ingress protection code	IP 68
Operating temperature	–40 ... +85 °C
Compatible fuel flow meters	DFM S7, DFM D S7, DFM Marine S7

DFM Industrial – industrial fuel and liquid flow meter

For liquids of various viscosity – water, gasoline, diesel, diesel oil, fuel oil.



Fuel and liquid flow meters: ❶ DFM Industrial 7, ❷ DFM Industrial 25

Specification

Relative accuracy error	0,5 %
Liquid kinematic viscosity	0,55 – 300 mm²/s
Supply voltage	10–50 V
Operating temperature	–20 ... +60 °C
MAX pressure, thread/flange	16 bar
Operating principle	oval gears rotation

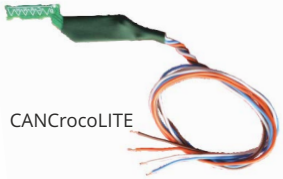
Models	MIN fuel rate, m³/h	MAX fuel rate, m³/h
DFM Industrial 7	0.72	7.2
DFM Industrial 25	2,5	25

Crocodile – safe receiving of vehicle operation data

- ✓ Reads the signals through the insulation of wires;
- ✓ powered from on-board automobile network;
- ✓ easy to install and operate;
- ✓ no need in preliminary setting-up.

CANCrocodile

1708Crocodile



CANCrocoLITE

CANCrocodile, CANCrocoLITE и 1708Crocodile – contactless data reading from vehicle CAN (j1939) and j1708 buses

- ✓ Fuel consumption;
- ✓ engine modes;
- ✓ sensors condition;
- ✓ fault codes;
- ✓ other data transmitted via serial bus.

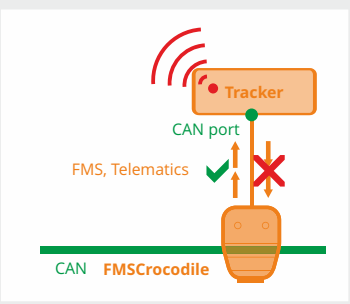
NozzleCrocodile – petrol and gas consumption monitoring

Petrol and gas fuel consumption control of the small commercial vehicle by injector control pulses.

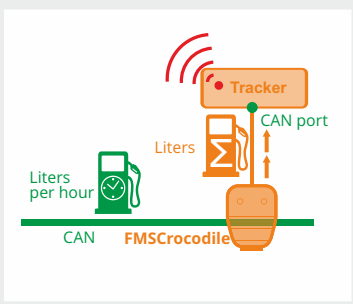
NozzleCrocodile

FMSCrocodile

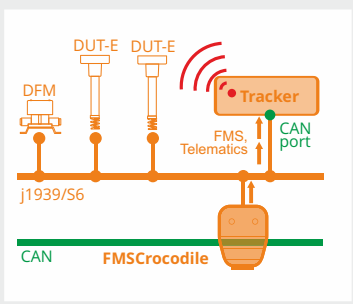
FMSCrocodile – a ready-made solution for safe integration of data from one or more automotive buses into CAN/S6 Telematics Interface



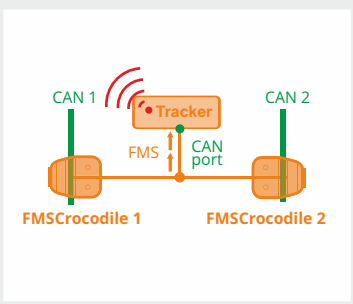
CANbus protection from active requests by tracking device



Fuel counter



Sending FMS and Telematics messages from CAN bus to telematics bus



Sending FMS messages from two CAN buses to tracking devices

Telematics gateway

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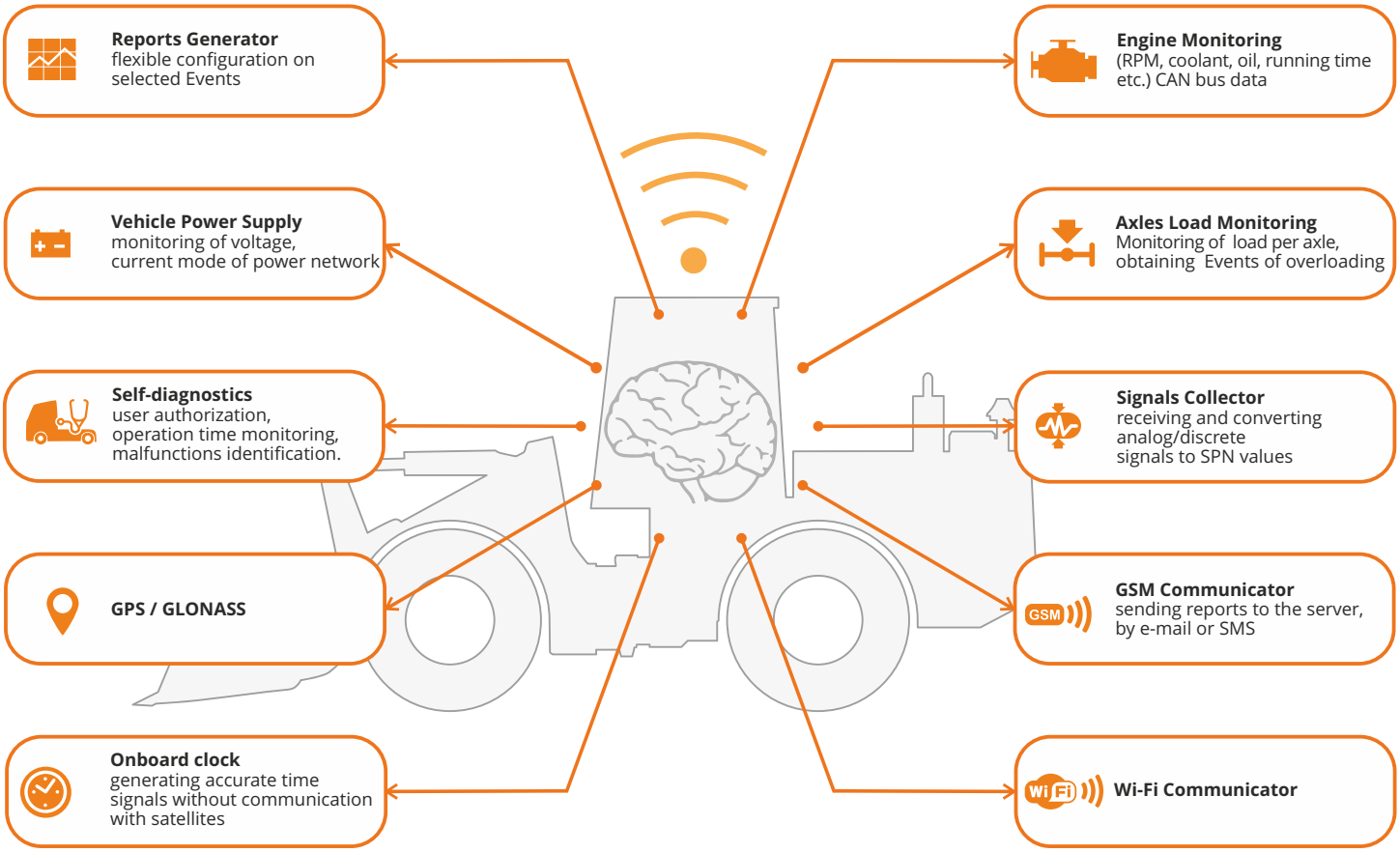
Technology

Monitoring more than 10,000 operation Parameters of machinery from CAN, ISOBUS and additional sensors of telematics system

- ✓ Unified Parameters – quick server setting and guaranteed integration with additional sensors.
- ✓ Recognizing quick Events – sharp change of the Parameters within 0.1 ... 10 s.
- ✓ Flexible customization of 20 Reports – adaptation to any machinery type.
- ✓ Automatic parsing of standard CAN j1939 and ISOBUS messages.

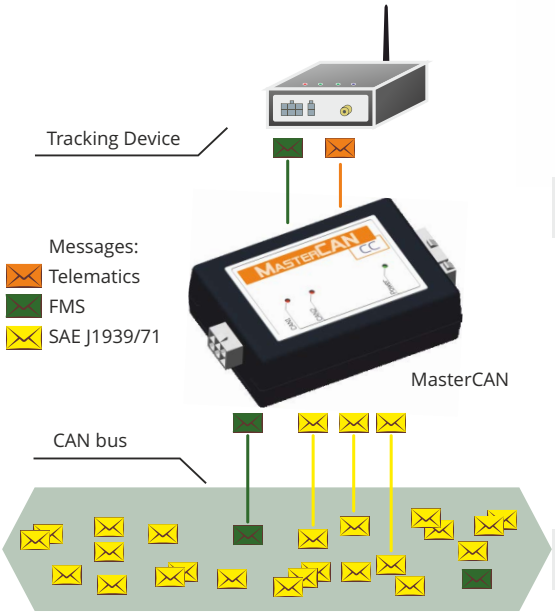
10 000+ parameters



	CANUp 27 Standard	CANUp 27 Pro LTE	CANUp 27 Pro Wi-Fi
Data transmission channels	2G	2G/3G/LTE	Wi-Fi
Digital interface	CAN j1939/S6	CAN j1939/S6 and CAN 2.0B	
Wireless interface	--	S7 (Bluetooth Low Energy)	
Physical signal inputs	Analog / Frequency / Digital		
Protocols	Wialon IPS v.2.0	Wialon IPS v.2.0/MQTT IBM Watson IoT	
Battery life	4 ... 6 hours		
Max. number of connected sensors	• 16 flow meters, • 16 fuel level sensors, • 1 analog sensor, • 1 frequency sensor	• 16 flow meters and 16 fuel level sensors, • 1 analog sensor and 1 frequency sensor, • 10 BLE sensors (flow meters, fuel level sensors, axle load sensors)	

MasterCAN

MasterCAN Data converters – data conversion of on-board serial buses and generation of ready-made information for the Telematics system



- ✓ Continuous data reading of CAN bus (SAE J1939) and J1708 bus (SAE J1587);
- ✓ selecting and arranging CAN parameters into messages (PGN) easy to read and process by telematics unit (GPS tracker)
- ✓ data translation from CAN/J1708 to CAN, RS-232, and RS-485 output messages.

Model	Input interface (protocol)	Output interface (protocol)
MasterCAN CC	CAN (SAE J1939/71)	CAN (SAE J1939/71)
MasterCAN C 232/485	CAN (SAE J1939/71)	RS-232 /RS-485 (ASCII/Modbus/DUT -E COM)
MasterCAN V-GATE	CAN (SAE J1939/ 71) & J1708 (SAE J1587)	CAN (SAE J1939/71) & RS-232 (ASCII/Modbus/DUT -E COM)
MasterCAN RS2CAN	RS-485 (Modbus)	CAN (SAE J1939/71)
MasterCAN CAN2RS	CAN (SAE J1939/71)	RS-485 (Modbus)

Model	Input signal	Output interface (protocol)
MasterCAN P2CAN	Pulse	CAN (SAE J1939/71)
MasterCAN C 232/485	Wireless S7	CAN (NMEA2000)

MasterCAN DAC

MasterCAN DAC – smart converter of digital and analog signals for vehicle telematics and stationary objects monitoring

Convert signals simultaneously in two directions

Analog signals of vehicle sensors

- ✓ Axle load sensors;
- ✓ oil and coolant temperature sensors;
- ✓ oil and hydraulic fluid pressure sensors;
- ✓ analog controllers;
- ✓ attachment position sensors;
- ✓ dashboard.

CAN j1939/S6 data

- ✓ Fuel flow meters with CAN j1939 interface;
- ✓ fuel level sensors with CAN j1939 interface;
- ✓ terminal with CAN interface;
- ✓ telematic gateway;
- ✓ data converters;
- ✓ CAN j1939 buses.

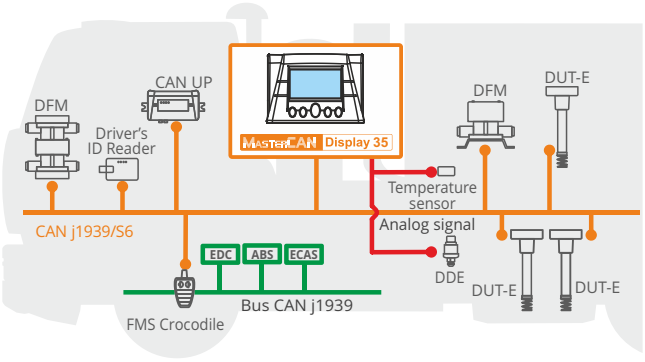
Model	Connection to CAN j1939/S6 interface	Number of analog outputs	Number of analog inputs
MasterCAN DAC 15	+	5	1 input/output
MasterCAN DAC 2113	+	13	21

TECHNOTON
ADVANCED MACHINERY TELEMATICS

MasterCAN Display 35

CAN j1939/S6bus display – visual monitoring of advanced machinery parameters

MasterCAN Display 35



10 000+ CAN and ISOBUS parameters

- ✓ Engine running time, engine speed;
- ✓ coolant and oil temperature, oil pressure;
- ✓ engine operation;
- ✓ condition of the hydraulic and pneumatic systems;
- ✓ condition of drive axles, gearboxes, differential.

500+ interface CAN j1939/S6 parameters

- ✓ Fuel level and volume in the tank from DUT-E;
- ✓ fuel consumption in different modes and operating time from DFM.

Two analog inputs

- ✓ Vehicle axle load;
- ✓ temperature sensor;
- ✓ conversion of analog signals into CAN data.

Models

G Truck. Level sensor in tank, fuel consumption, engine operating time via CAN, speed, operating time, axle load. 21 pre-set screens.

T Tractor. Fuel level in tank, fuel Consumption, engine operating by CAN bus, machine hours. Pre-set screens (27 screens, two parameters on screen).

U Universal. Model with extended user rights for configuring screens. Displaying any of 10500+ CAN or ISOBUS operation parameters. Flexible adjustment of number of screens (21 groups, 10 screens in each). Configuration displayed parameters (1 or 2 on one screen, change parameter names and icons). Display of parameters not included in CAN and ISOBUS.

M Vessel. Control of fuel in the tank, generator's and boiler's engine fuel consumption. Functionality is the same as the **U** model. Pre-set screens (37 screens, two parameters on screen).

MasterCAN Tool

CAN bus analyser-simulator MasterCAN Tool is a analytical tool for engineers, programmers and other professionals in the area of design and servicing vehicle electronic units

MasterCAN Tool

- ✓ Parsing and displaying PGNs and SPN names and measurement units as text;
- ✓ displaying current values of parameters (SPN) in decimal and HEX formats;
- ✓ recording values of parameters to a file (logging);
- ✓ emulation of individual PGN with SPN that can be edited or creation of PGN groups and their transmission to CAN bus;
- ✓ allows selection between 11/29 bit length identifiers during CAN message emulation;
- ✓ configurable send/receive data baud rate – 100/125/250/500/1000 kbit/s;
- ✓ simple, easy and safe connection to CANbus with CANCrocodile contactless reader;
- ✓ an option to enable the terminal resistor of CAN bus using software;
- ✓ CAN bus load indicator.

Axle load sensors

GNOM

Wired sensors integrates in a fleet monitoring system

GNOM S7

Wireless sensors, data transfer via BLE, work as part of the Telematics system and/or autonomously

- ✓ Online axle load and vehicle weight measurement;
- ✓ detecting “underhand” cargo;
- ✓ locating places and number of loading/unloading;
- ✓ avoiding fines for exceeding maximum axle load.

GNOM DDE

GNOM DDE S7

GNOM DDE и GNOM DDE S7 – pressure sensors for vehicles with pneumatic suspension system

- ✓ Installed in air line or pneumatic cushion;
- ✓ measures suspension’s shift when vehicle load changes;
- ✓ data transfer to terminal and/or to driver's smartphone (GNOM DDE S7).

Model	GNOM DDE	GNOM DDE S7
Inlet pressure	0...0,8 MPa	0,1...1,4 MPa
Inaccuracy	up to 2,5%	up to 1,0%
Power supply voltage	8...32 V	––
Output signal	0,25...3,80 V	––
Power-supplied form built-in battery	––	5 years
Wireless (BLE) signal range	––	10 – 20 m

GNOM DP, GNOM DP CAN

GNOM DP S7

GNOM DP, GNOM DP CAN, GNOM DP S7 – shift sensor for vehicles with spring suspension system

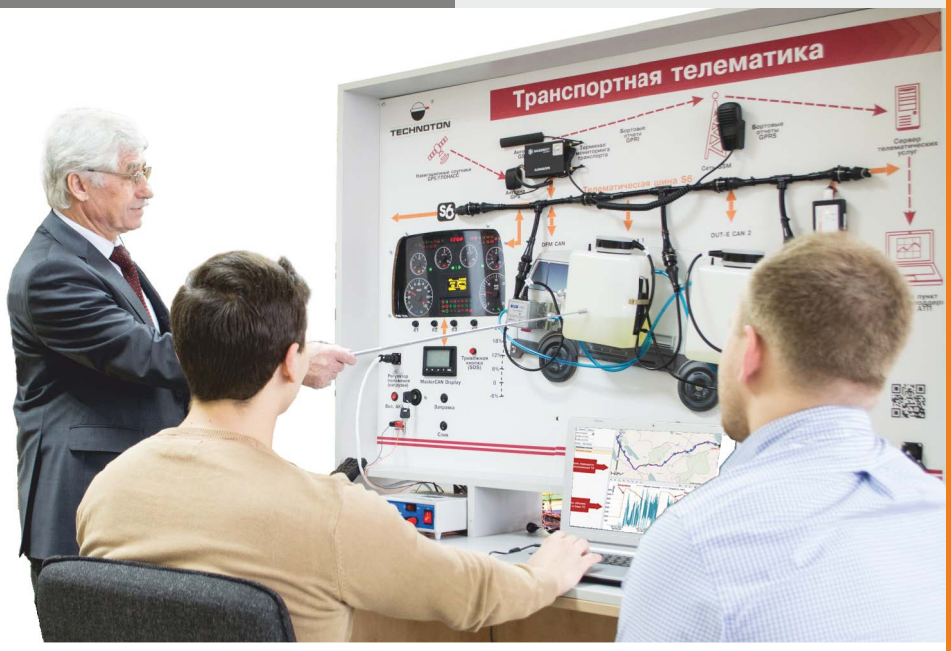
- ✓ Installed on rear axle or rear bogie of truck and/or semi-trailer;
- ✓ measures suspension’s shift when vehicle load changes;
- ✓ data transfer to terminal and/or to driver's smartphone (GNOM DP S7).

Model	GNOM DP	GNOM DP CAN	GNOM DP S7
Inaccuracy	up to 5,0%	up to 5,0%	up to 2,0%
Power supply voltage	8...32 V	8...32 V	––
Output signal / Interface	1,54...3,46 V	CAN j1939	––
Power-supplied form built-in battery	––	––	5 years
Wireless (BLE) signal range	––	––	10 – 20 m

“Vehicle telematics” educational trainers

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Functional simulation of operation of a vehicle and telematics system



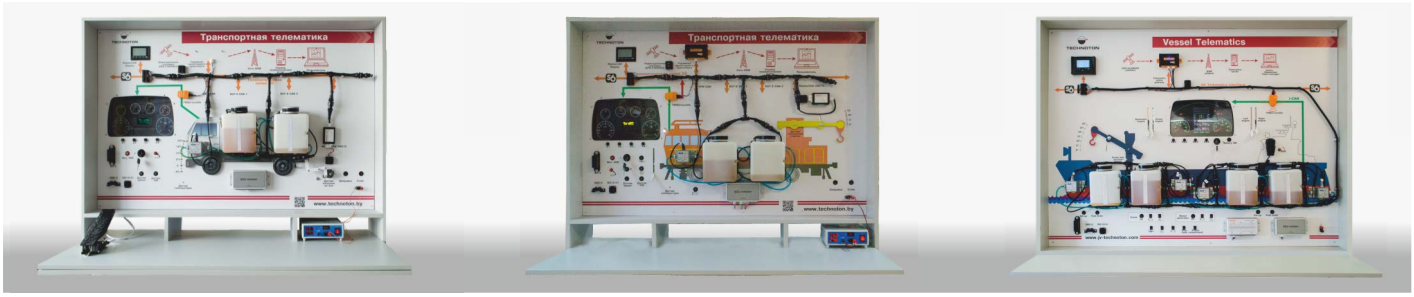
Purpose of use

- ✓ Educational research activities of students (”Land transportation”, “Railroad machinery” and “Water transportation” fields of study);
- ✓ training telematics equipment installation specialists and telematics software developers;
- ✓ demonstrating telematics system functionality (presentations, exhibitions, show-rooms).

Monitored parameters

- ✓ fuel volume in each tank;
- ✓ fuel temperature, presences of water in tank;
- ✓ fuel consumption rate in engine’s fuel lines, by various consumption modes;
- ✓ engine operation time, by various modes;
- ✓ engine RPM;
- ✓ oil temperature and pressure;
- ✓ axle load;
- ✓ ignition key position;
- ✓ onboard electrical network voltage;
- ✓ doors opened/closed, alarm button pressed;
- ✓ position, route, speed of movement.

Types of trainers



Truck | Track machine | Watercraft

Diesel generators | Agricultural machinery

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Railroad machinery telematics

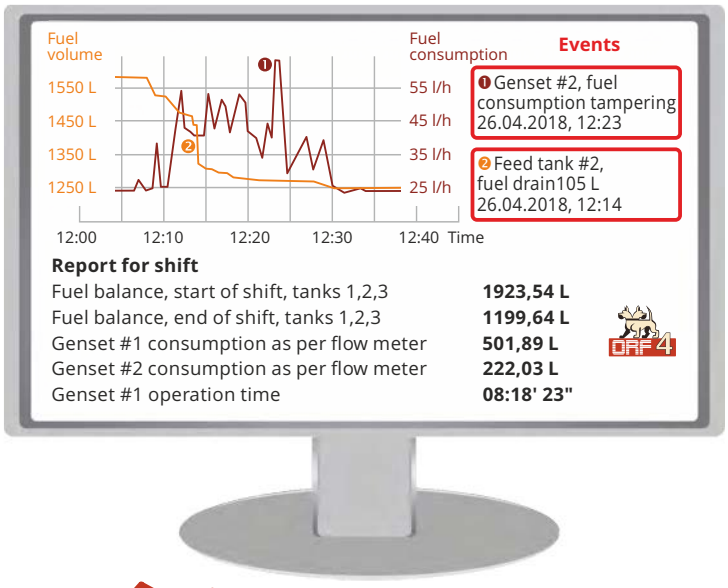
- Online monitoring of fuel consumption by operation mode
- Online monitoring of fuel volume, fill-ups and draining
- Fuel theft prevention from fuel line and tank
- Monitoring for engine hours by operation mode
- Monitoring for engine hours by operation mode

Parameter monitoring

- ✓ Fuel consumption and operation time of main and reserve gensets in various operation modes – warming-up, normal load mode.
- ✓ Accurate volume and temperature of fuel in main and feed tanks, also total volume of fuel.
- ✓ Data from standard CAN bus and CAN j1939/S6 interface – temperature, level and pressure of liquids.

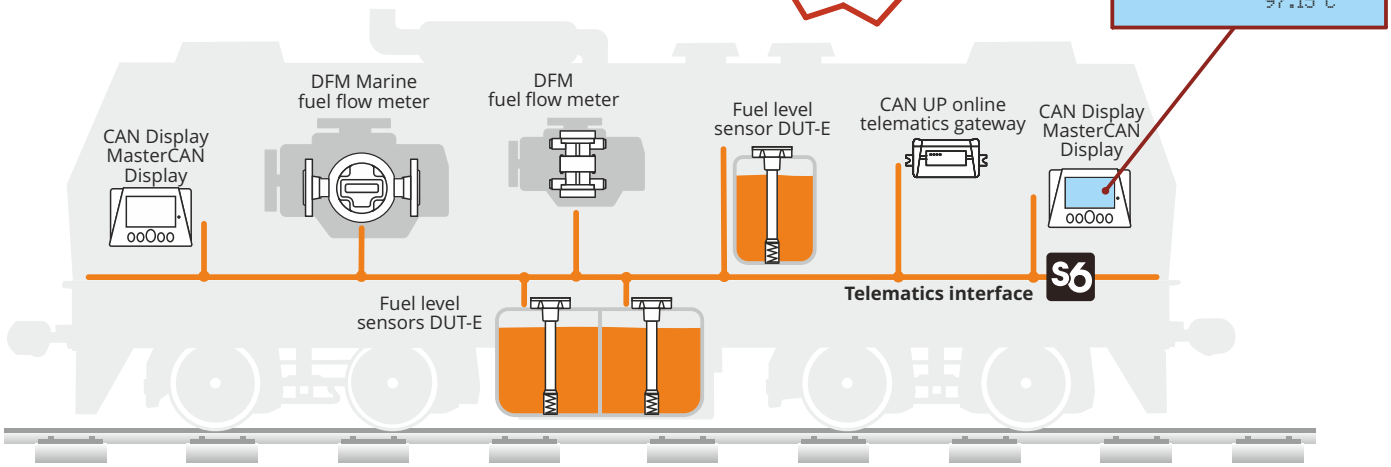
Event detection

- ✓ Drain/Fillings of fuel, genset start/stop.
- ✓ Fuel consumption tampering, engine failures and malfunctions.
- ✓ Event notification via SMS and e-mail.



Telematics system set

MONITORING 16 ENGINES AND 16 FUEL TANKS



Truck tanker monitoring

TECHNOTON
ADVANCED MACHINERY TELEMATICS

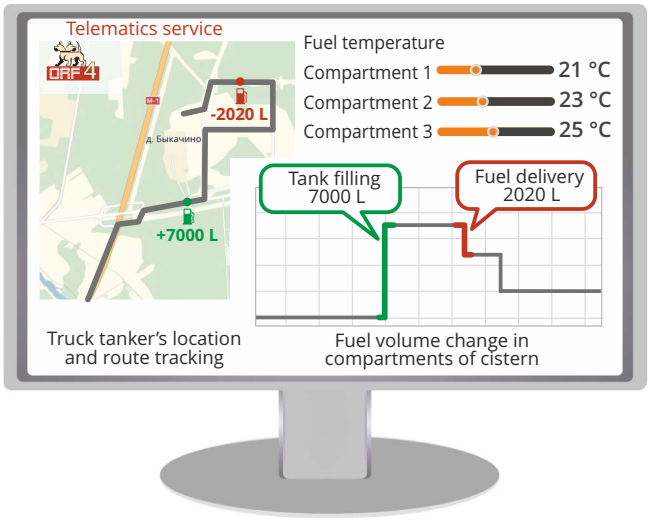
- **Fuel monitoring in compartments of cistern**
- **Fuel temperature monitoring**
- **Location and route tracking**
- **Fuel theft prevention**
- **Maintenance optimization**

Cistern monitoring

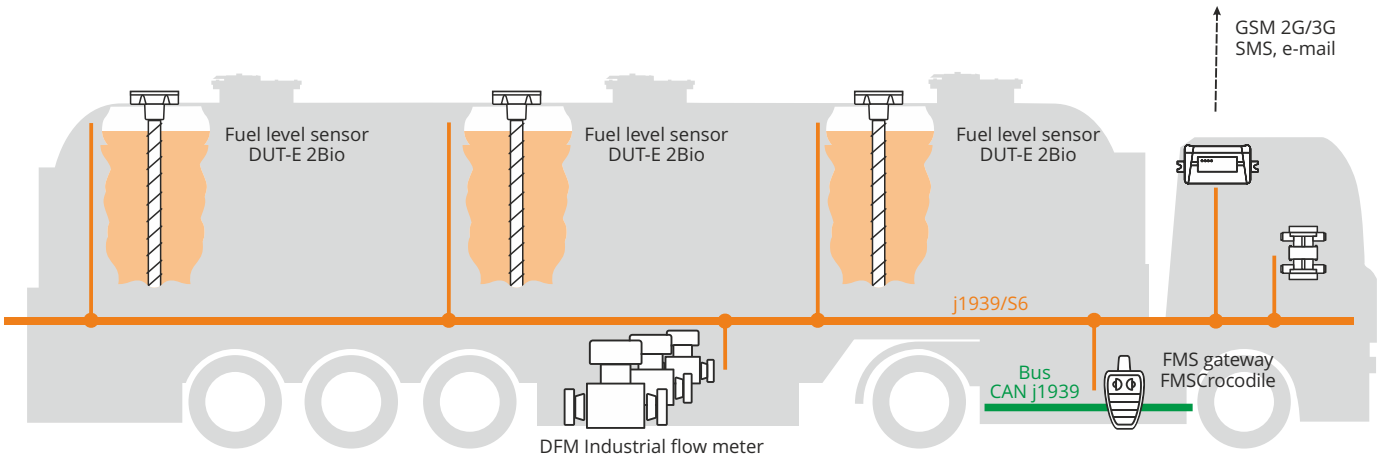
- ✓ Online notification on Events – filling compartments and fuel delivery.
- ✓ Precise measurement of fuel volume in each compartment, regardless of fuel type.
- ✓ Online fuel temperature monitoring in each compartment.
- ✓ Fuel delivery volumes measurement by flow meter.
- ✓ Tracking truck's route and places of Events "cistern filling" and "fuel delivery".
- ✓ Defining fuel type in each compartment of cistern.

Truck telematics

- ✓ Direct measurement of fuel consumption and engine operation time – total and split by operation modes “Idling”, “Optimal”, “Overload”.
- ✓ Predictive maintenance – remote diagnostics of malfunctions of electronic control units of vehicle and monitoring assemblies’ wear-out.



Telematics system set-up



Solution

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Sea and river vessel telematics

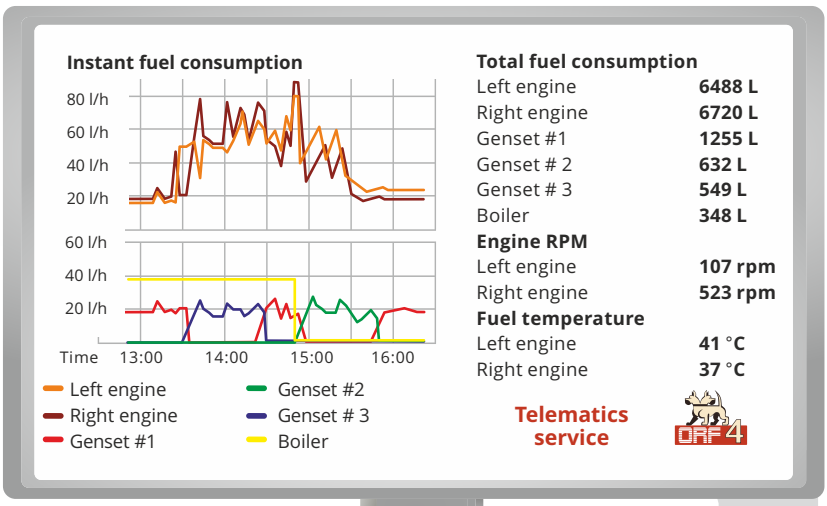
- Online monitoring of fuel consumption by each engine
- Fuel theft prevention from fuel line
- Monitoring operation time of each engine
- Updating fuel consumption quotas

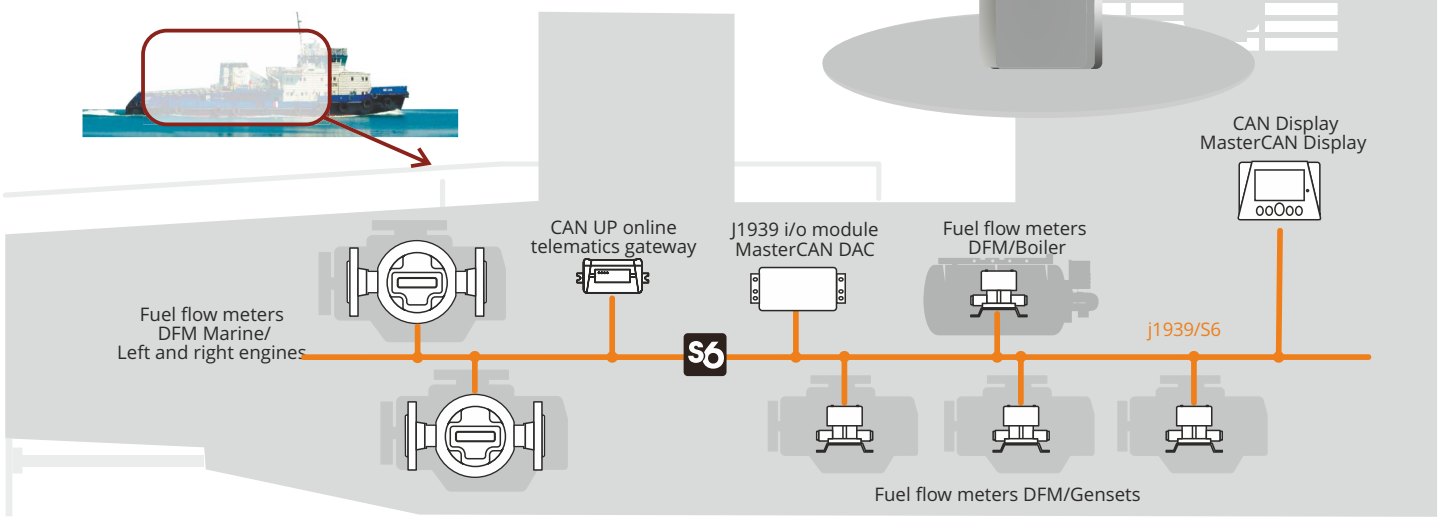
Parameter monitoring

- ✓ Instant fuel consumption of left and right engines, diesel gensets, boiler.
- ✓ Operation time of each fuel consumer in “Idling”, “Normal load”, “Overload” modes.
- ✓ Engine RPM, temperature of liquids and other data from standard and additional analog sensors.
- ✓ Location, route and distance traveled.

Event detection

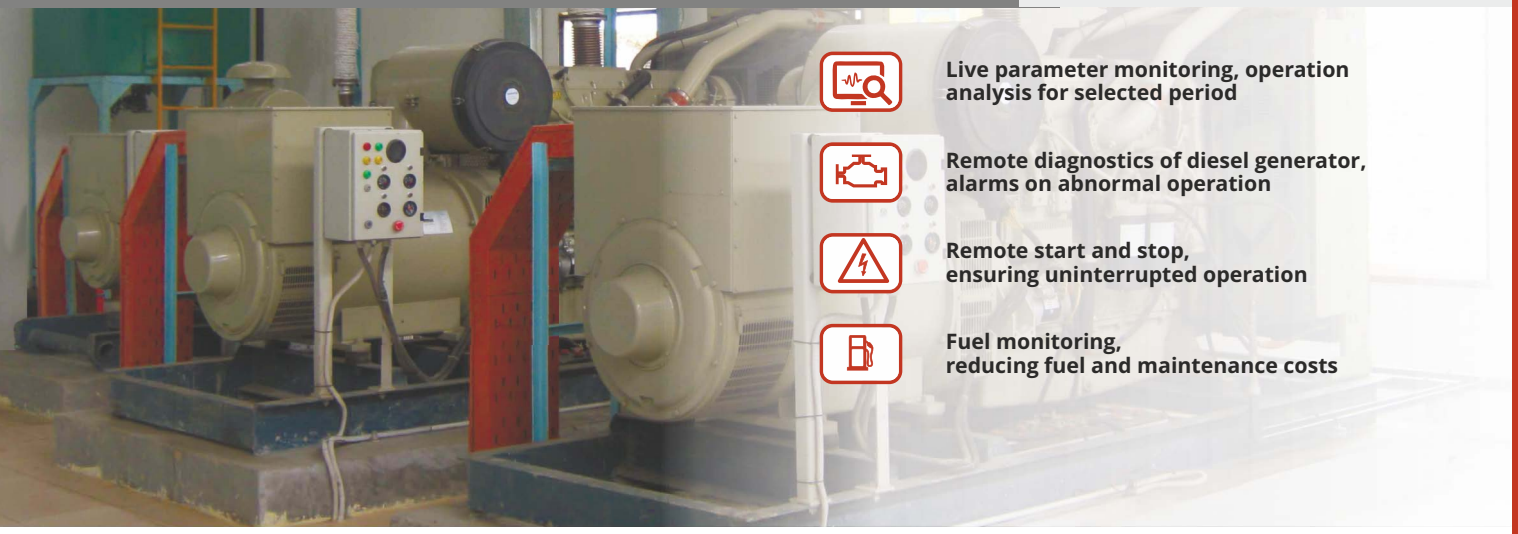
- ✓ Start/stop of engines, lighting equipment on/off.
- ✓ Flow meter consumption data tampering, excessing engine RPM limit, boiler overheating.
- ✓ Event notification over SMS and e-mail.





Diesel generator monitoring system

TECHNOTON
ADVANCED MACHINERY TELEMATICS



- **Live parameter monitoring, operation analysis for selected period**
- **Remote diagnostics of diesel generator, alarms on abnormal operation**
- **Remote start and stop, ensuring uninterrupted operation**
- **Fuel monitoring, reducing fuel and maintenance costs**

Tracking engine performance, fuel monitoring

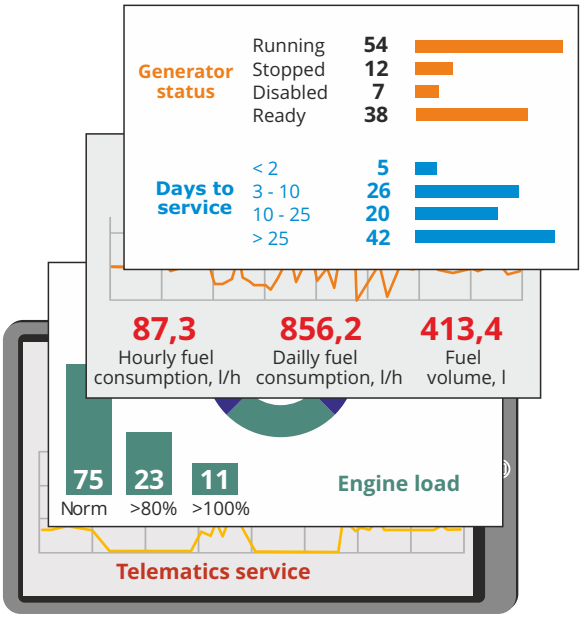
Fuel consumption in idling and normal operation modes, fuel level in tanks, tank refilling and draining volumes, temperature of fuel, engine hours, running duration and workload modes of engine, coolant temperature, oil pressure, battery and network voltage, emergency stops on engine.

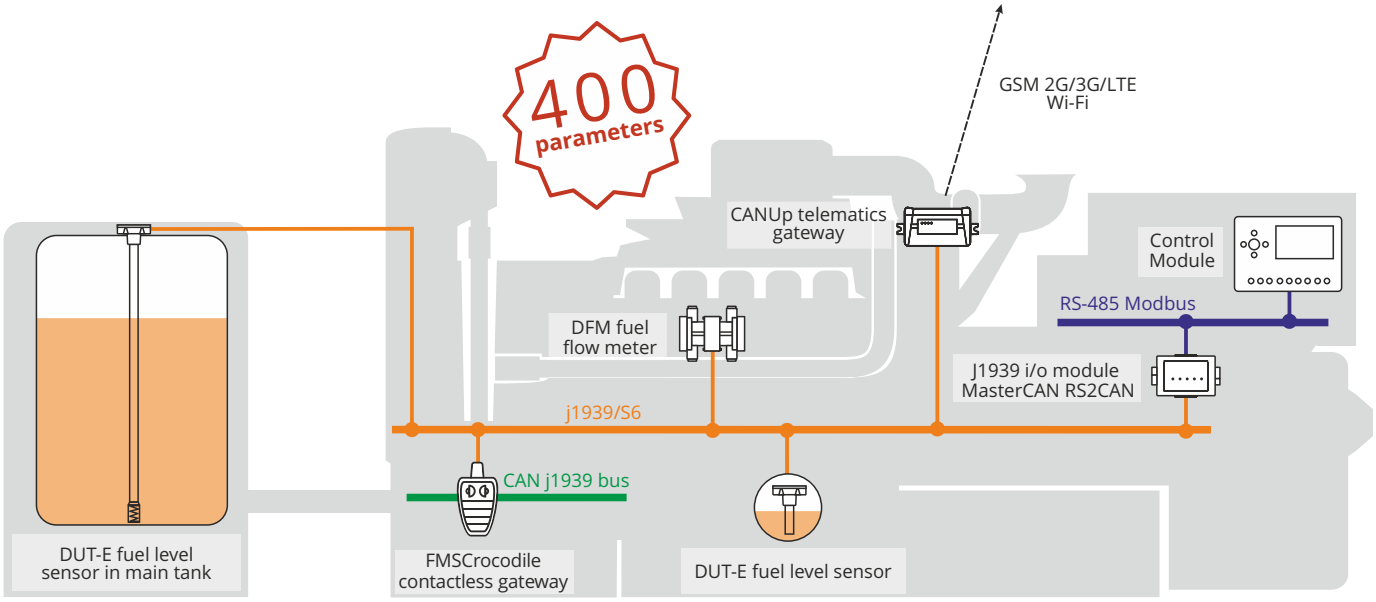
Alternator operation monitoring

Output voltage, active power, total generated power, Cos φ, load percentage, frequency of current, voltage and current of phases, power per liter of fuel used, phase imbalance, failed start and data readings from genset controller over Modbus RTU.

Automation and remote control

Automatic tank refueling, emergency engine stop based on abnormal parameters values, pre-start check, remote start and stop.





Solution

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Mining equipment telematics

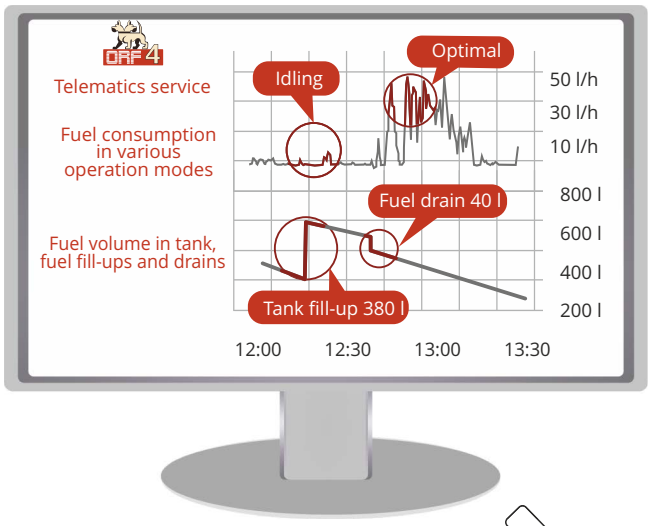
- **Fuel tank monitoring**
- **Fuel consumption measurement in various operation modes**
- **Engine running time recording in various operation modes**
- **Maintenance according to real equipment condition**
- **Operation parameters monitoring**

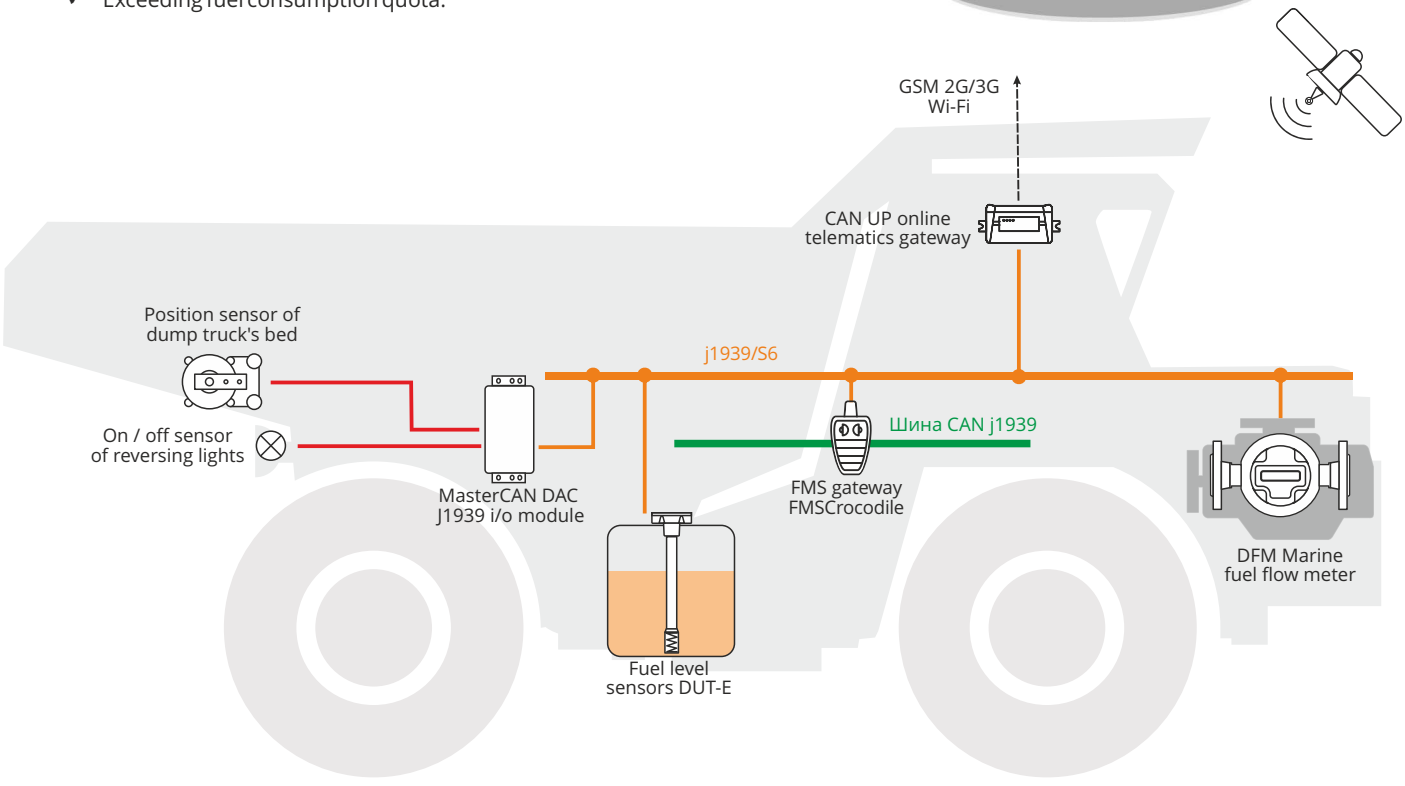
Parameter monitoring

- ✓ Exact volume of fuel remaining in tank.
- ✓ Fuel consumption and engine working time – total and by operation modes: "Idling", "Optimal", "Overload".
- ✓ Position of attachments – bucket, blade, drill.
- ✓ Temperature and pressure of liquids and other operational parameters of engines.
- ✓ GPS location, route.

Event detection

- ✓ Fuel tank fill-up, draining from tank.
- ✓ Exit from defined polygon (geofencing).
- ✓ Exceeding fuel consumption quota.





Fuel storage monitoring

TECHNOTON
ADVANCED MACHINERY TELEMATICS

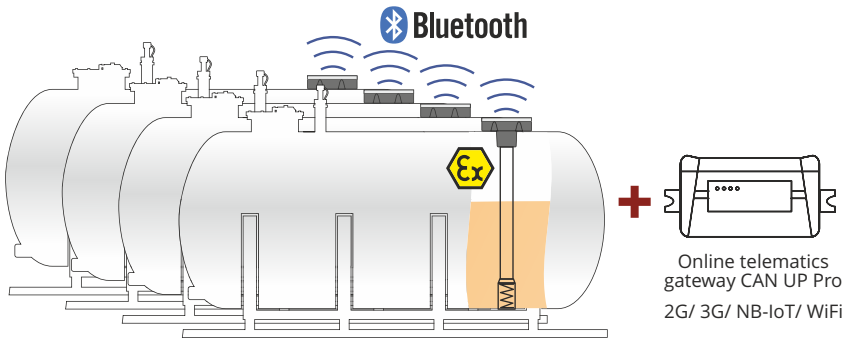
- Online fuel volume monitoring
- Online monitoring of fuel fill-ups and draining
- Fuel theft prevention

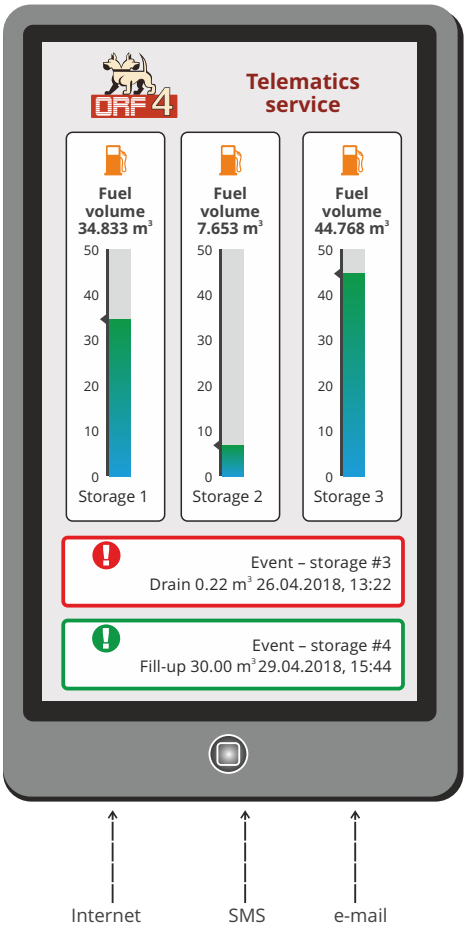
WIRELESS SOLUTION!

Advantages

- ✓ Accurate fuel volume measurement, independent on temperature extension.
- ✓ Automatic detection of “Fill-up” and “Drain” Events.
- ✓ Notification on fuel drain and fill-up of storage over SMS and e-mail.
- ✓ In-built battery – sensor operates without external power supply.
- ✓ Simple set-up – calibration table for storage is saved in sensor's memory.
- ✓ Sensor length extension up to 3,000 mm.
- ✓ Sensitivity to fuel level change is 0.1mm.

Up to 10 storages monitored simultaneously





Telematics services and IoT platforms

DAF 4 · wialon · Azure · ORACLE · Watson

Solution

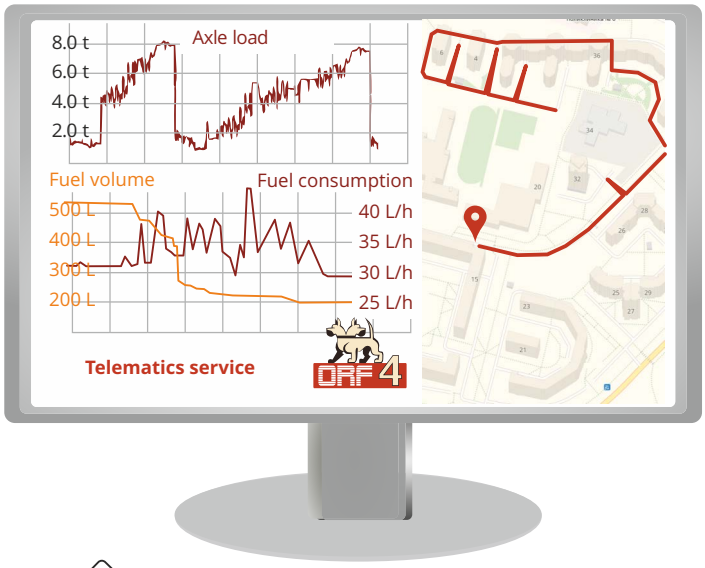
TECHNOTON
ADVANCED MACHINERY TELEMATICS

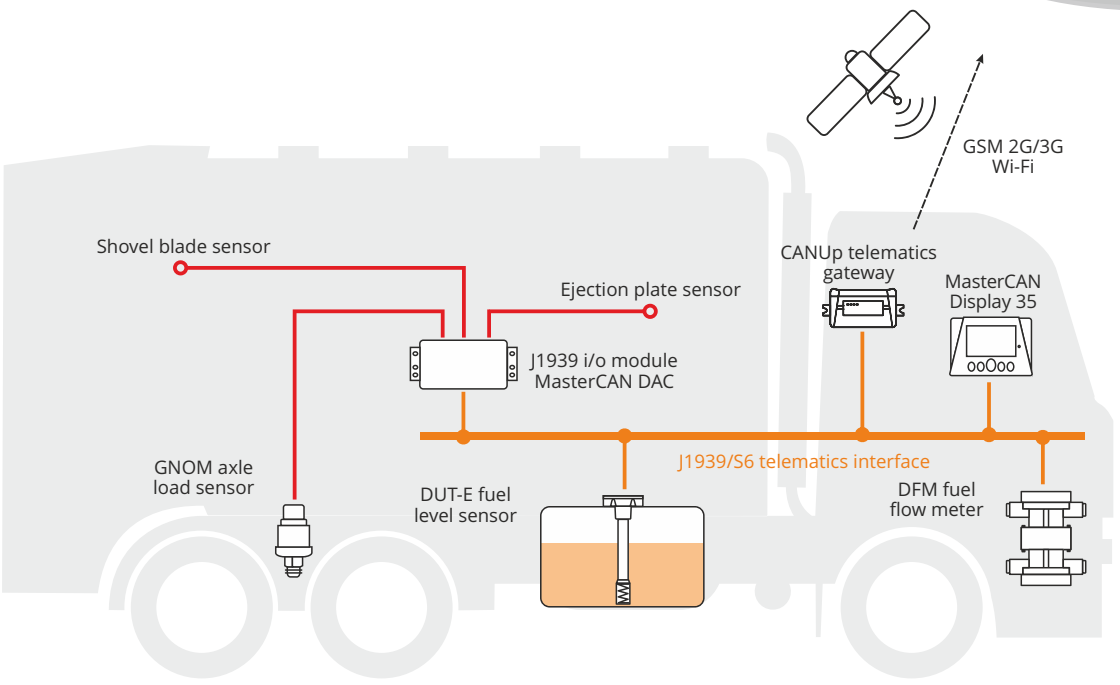
Garbage truck monitoring

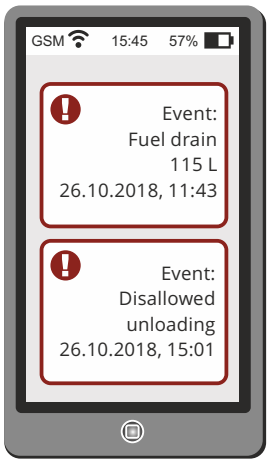
- Tracking places and time of garbage loading/unloading
- Main body filling-up and axle load monitoring
- Accurate fuel monitoring and theft prevention
- Remote diagnostics of engine and equipment
- Detection of unloading in disallowed locations

Parameter monitoring

- ✓ Direct measurement of engine operation time and fuel consumption: overall and by operation modes “Idling”, “Optimal”, “Overload”.
- ✓ Online notification on fuel fill-up and draining from fuel tank.
- ✓ Tracking current location and route, places and time of garbage loading/unloading.
- ✓ Monitoring of filling of main body by axle load, determining weight of loaded/unloaded garbage.
- ✓ Online notification on leaving the route/geofence, alarms on disallowed loadings/unloadings.







Cold chain telematics

TECHNOTON
ADVANCED MACHINERY TELEMATICS

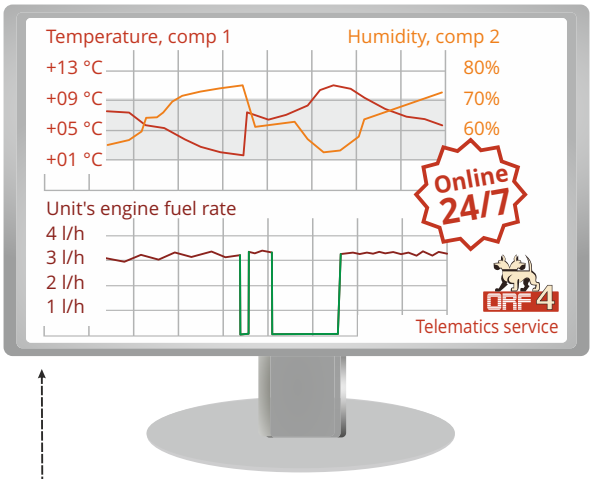
- Temperature & humidity check
- Fuel consumption monitoring
- Fuel theft prevention
- Diagnostics of refrigeration unit's engine
- Notification on Events

Telematics system features

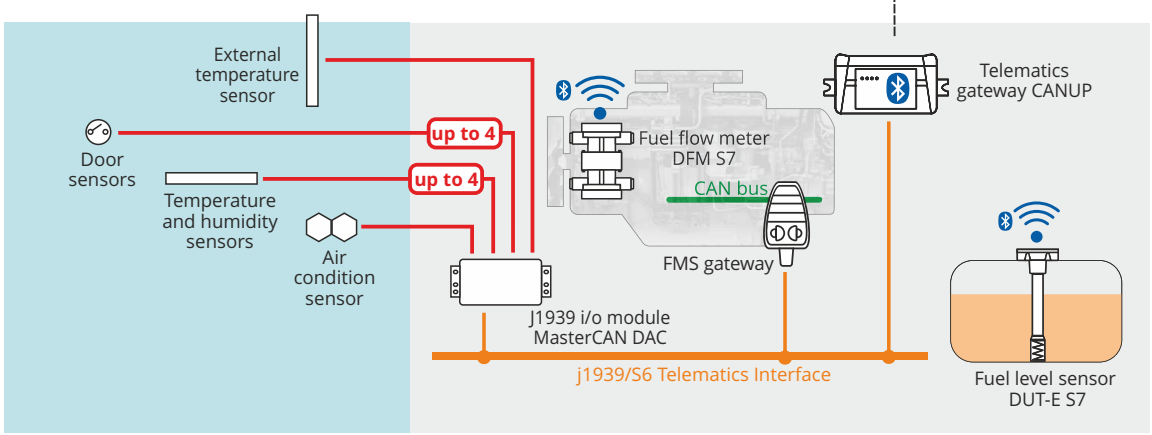
- ✓ Alarms on violations of temperature and humidity conditions in cargo compartment.
- ✓ Refrigeration unit engine monitoring: fuel consumption measurement, fuel volume in tank monitoring, engine health check.
- ✓ Notifications on opening/closing cargo compartment doors; alarms on sharp heeling and vibrations of compartment.

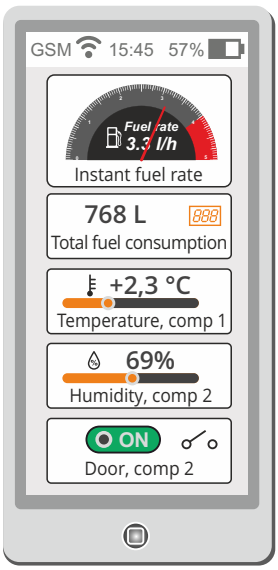
Benefits of telematics system

- ✓ Ensuring appropriate condition of transportation, preventing spoilage and damage of cargo.
- ✓ Accurate fuel consumption accounting, preventing fuel theft.
- ✓ Increasing refrigeration unit's engine lifecycle by implementing predictive maintenance approach.



GSM 2G/3G





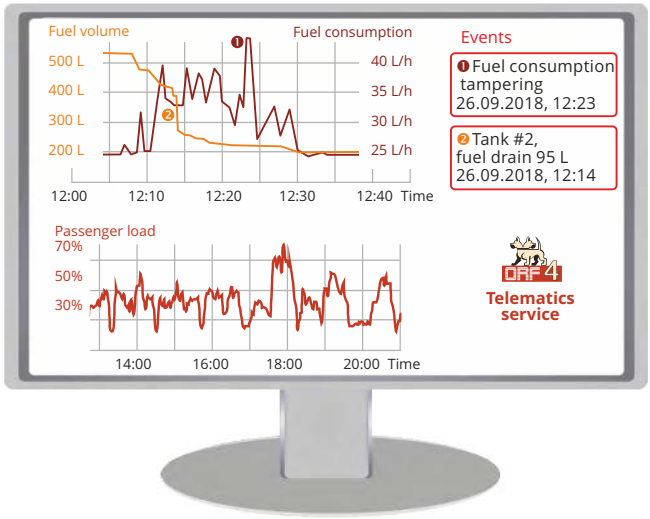
Solution

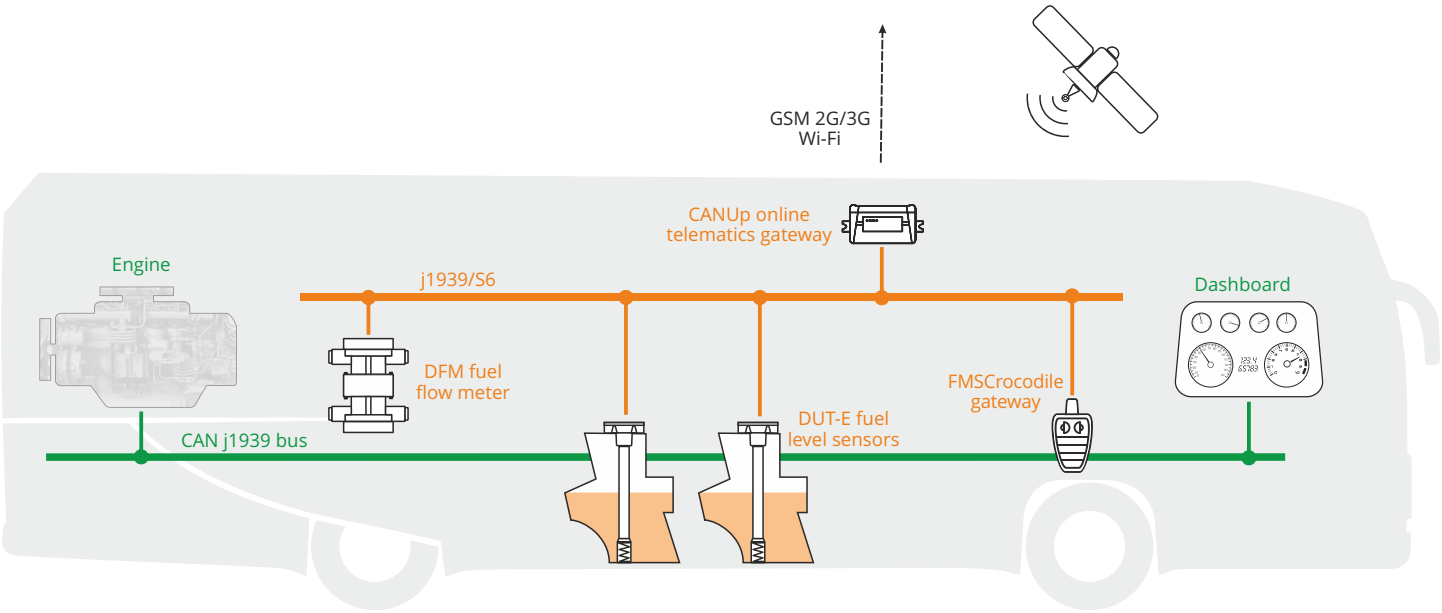
TECHNOTON
ADVANCED MACHINERY TELEMATICS

Bus monitoring system

Parameter monitoring

- ✓ Precise measurement of remaining fuel in tank and fuel consumption, sending data to dashboard.
- ✓ Direct fuel consumption and engine operation time monitoring – in total and by operation modes "Idling", "Optimal", "Overload".
- ✓ Notifications on fuel fill-up and measuring from tank.
- ✓ Passenger load monitoring by detecting axle load.
- ✓ Notifications on dangerous driving – harsh braking, acceleration, turns, speeding.
- ✓ Predictive maintenance – remote diagnostics of malfunctions of electronic control units and wear-out of mechanisms.
- ✓ GPS-tracking of position, route and checkpoints.





Digital drilling rig

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Remote monitoring of operating parameters

Prevention of equipment idling

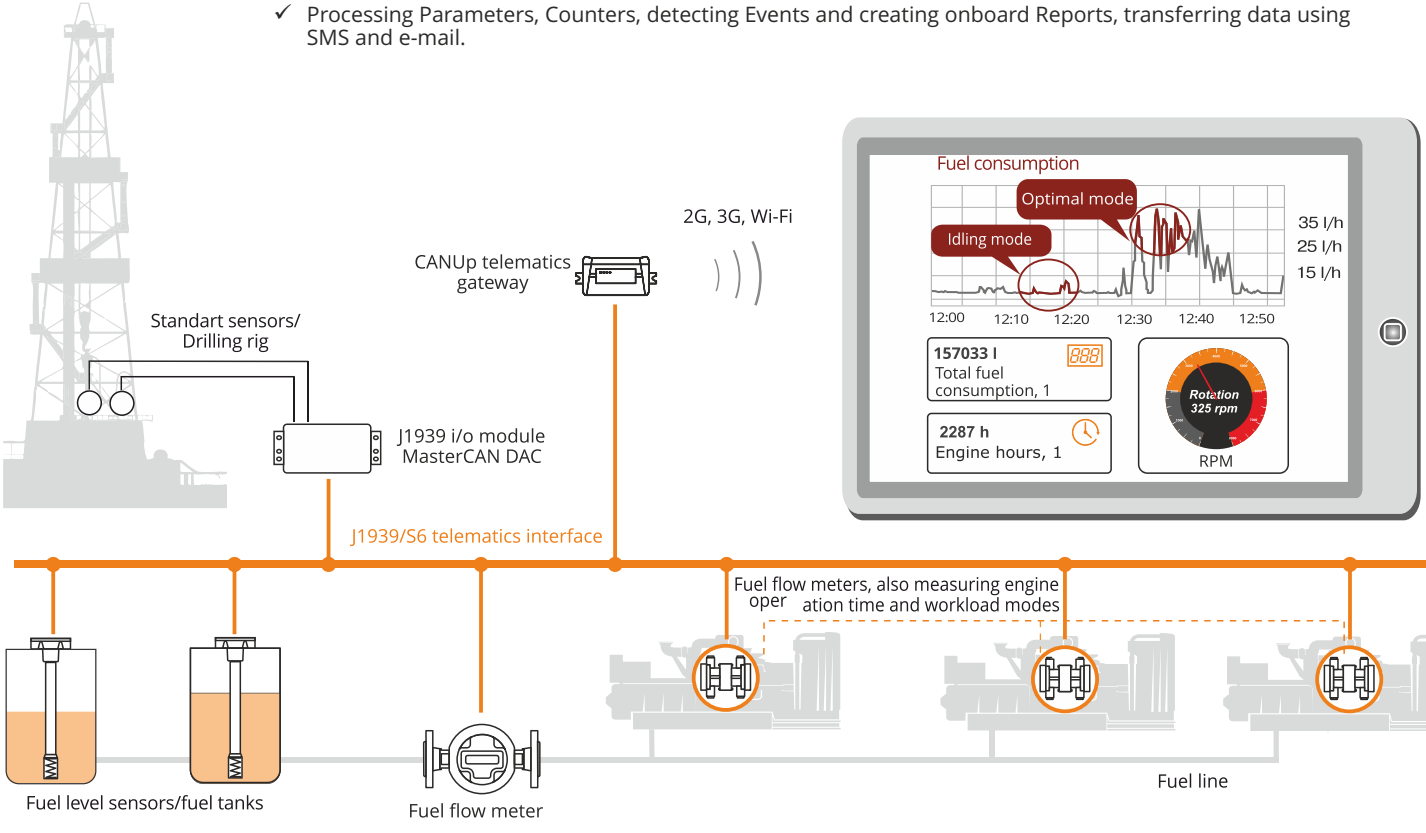
Fuel consumption monitoring

Parameter monitoring

- ✓ Volumes of fuel fill-up and draining from tank.
- ✓ Current fuel volume in liters, fuel level in mm.
- ✓ Total current fuel volume .
- ✓ Real fuel consumption measurement: total and by operation modes "Idling", "Optimal", "Overload".
- ✓ Instant fuel consumption in fuel lines.
- ✓ Temperature of fuel in tank, in fuel lines.
- ✓ Genset operation mode by fuel consumption.
- ✓ Coolant and oil temperature.
- ✓ Oil pressure.
- ✓ Genset total operation time and by operation modes "Idling", "Optimal", "Overload".
- ✓ RPM of rotor.
- ✓ Genset RPM.

Telematics system

- ✓ 100% compatibility of the equipment, connected and power-supplied through single cabling system, common data transfer protocol.
- ✓ Conversion of signals from analog standard and additional sensors of drilling rig to digital messages.
- ✓ Processing Parameters, Counters, detecting Events and creating onboard Reports, transferring data using SMS and e-mail.



Solution

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Monitoring of agricultural machinery

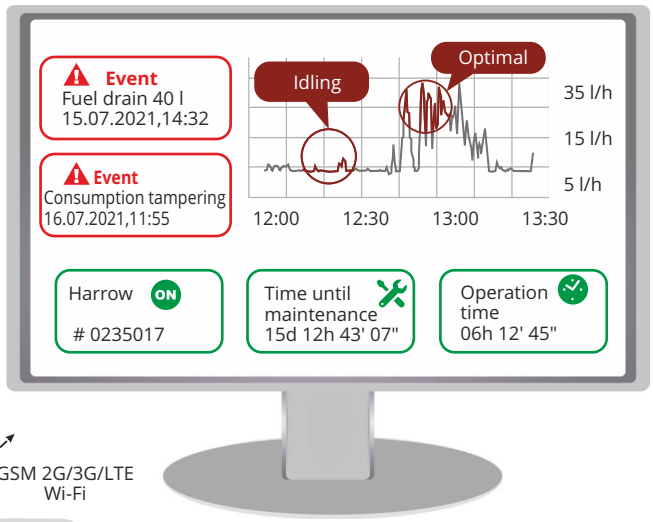
- **Control of fuel consumption, refueling and draining**
- **Operation time monitoring, engine operation modes monitoring**
- **Maintenance according to real equipment condition**
- **Location and geofences monitoring**
- **Monitoring of hauling/attached equipment operation**

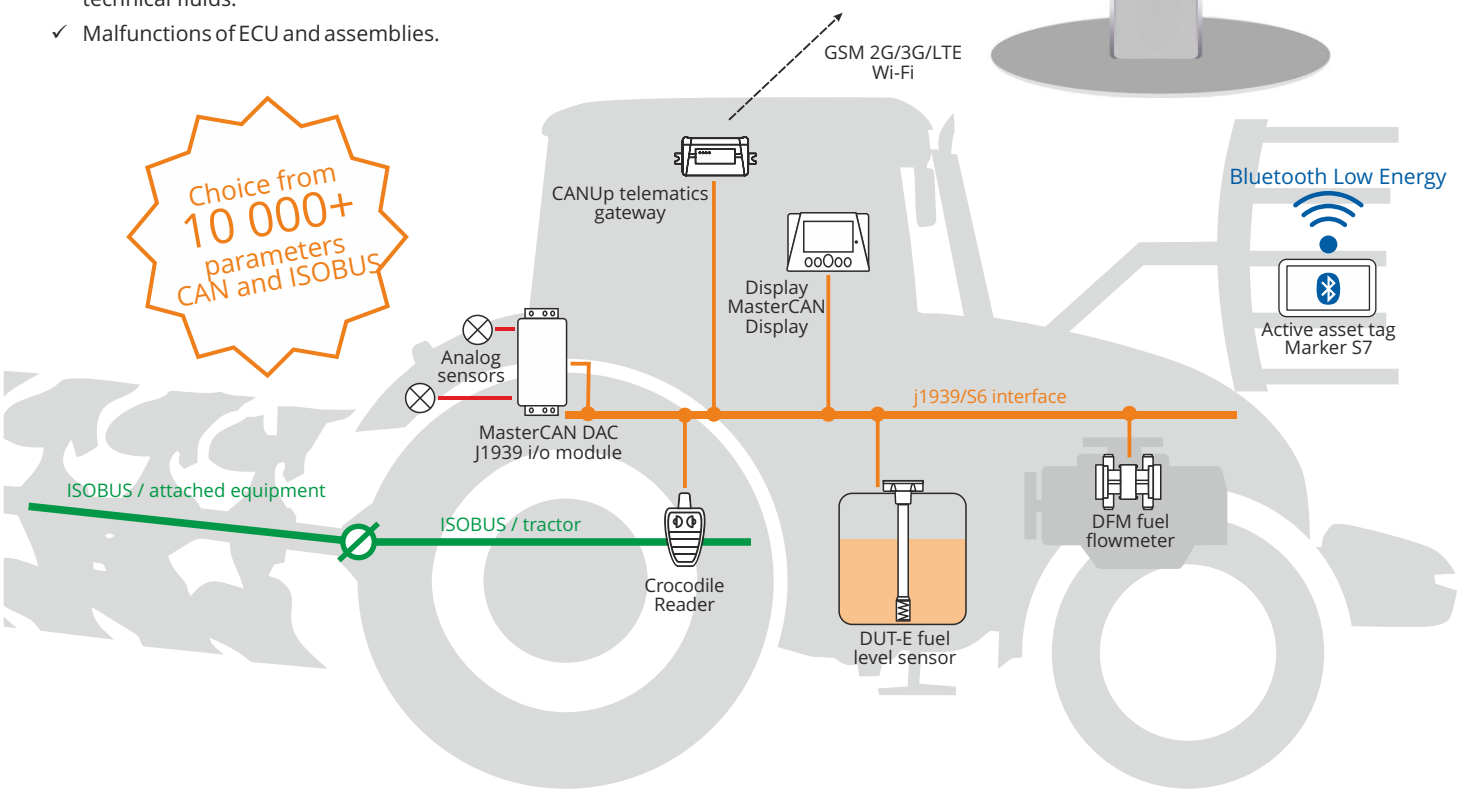
Monitored parameters

- ✓ Fuel consumption and operation time – total and by operation modes: “Idling”, “Optimal”, “Overload”.
- ✓ Exact volume of fuel remaining in tank.
- ✓ ID, hauling and attached equipment operation.
- ✓ Temperature and pressure of oils, coolant, hydraulic fluid.
- ✓ GPS location, geofences.

Online notifications

- ✓ Fuel tank fill-up, draining from tank.
- ✓ Exit from defined polygon (geofencing).
- ✓ Equipment coupling or uncoupling.
- ✓ High temperature or pressure drop of technical fluids.
- ✓ Malfunctions of ECU and assemblies.

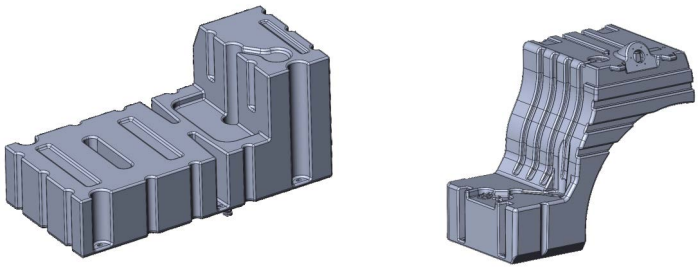




Fuel sensor for complex tank

TECHNOTON
ADVANCED MACHINERY TELEMATICS

Buses, tractors, harvesters and other special equipment have complex-shaped fuel tanks – irregular shells and baffles, inside concavities and steps. Mass-produced floating level sensors cannot be installed in such tanks without re-engineering. That includes lever length and stroke angle adjustment - it pays off only with large volumes of production, which is rarely the case for special machinery.



Example: tank shape of city buses

DUT-E fuel level sensor has no moving parts and is suitable for tanks of any shape. This is convenient for staple and other small-scale production. DUT-E accuracy is higher than that of the floating level sensor type. Moreover, DUT-E can have a CAN J1939/71 output interface for sending FSM-messages, voltage or frequency output – that allows using DUT-E as standard fuel gauges for the majority of vehicle dashboards.

Functions

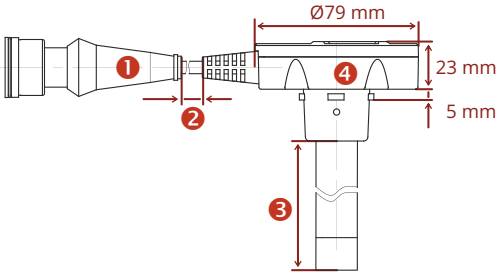
- ✓ High accuracy of volume measurement regardless of tank shape.
- ✓ Fuel volume data sending to analog or digital dashboard of vehicle.
- ✓ Thermal stability – data is not dependent on ambient temperature.
- ✓ Displaying fuel volume in percentage (FMS-message) and in liters.
- ✓ Self-diagnostics.
- ✓ Signal filtration of fuel fluctuations in motion.

Design

- ✓ No movable parts.
- ✓ No “blind zones” of measurement.
- ✓ Easy installation – vehicle assembly technology is not changing.
- ✓ Sensor’s wires meet standard of automotive manufacturing.

The sensor is supplied in agreed configuration:

❶ Type of connector of output signal cable
❷ Length of output signal cable
❸ Length of sensor
❹ Tank calibration table according to 3d-model of tank from AutoCAD, SolidWorks, CATIA and other CAD softwares



Certificates

Solution

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City buses

Customer

Municipal company in Latvia, which provide passenger transportation inside cities. The buses are used at 74 routes - 6 tram lines, 18 trolleybus lines and 50 bus lines. The annual mileage of the fleet is about 45 million km.

3800+ employees

500+ city buses

140 млн passengers transported per year

Mercedes-Benz Citaro buses

Machines

Mercedes-Benz Citaro urban buses - two-axle, three-axle and three-axle articulated. The total number of passengers carried (depending on composition) is 147-177, engine power is 185-260 kW, fuel tank volume is 200-400 liters.

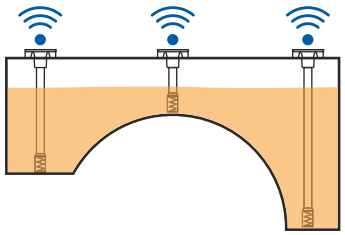
Task

Fuel level monitoring in complex-shaped fuel tanks.

Solution

Fuel level and volume in tanks is measured by DUT-E S7 wireless fuel level sensors. The data is transmitted to vehicle telematics unit via BLE (Bluetooth), which reports information to an online fleet management service.

Two or three sensors are needed for complex-shaped fuel tanks. This installation eliminates "blind zones", thus measurement inaccuracy remains under ±1% of remaining fuel volume in the tank.



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

Result

Fleet dispatcher monitors actual remaining fuel inside the tank of each bus in real time and decides on keeping vehicle on the route or directing it for refueling. Fuel data is later on exported to specialized software suit for automatic compilation of travel and route sheets required by the State Revenue Service.

Harbor tugboats

Customer

Commercial seaport of international importance. Developed logistics infrastructure, including connection to railway node.

30 000 tons/day cargo overloading

5 vessels processing at one time

400 railway car at one time

Machines

Harbor tugboats, small cargo vessels.

Task

Fuel consumption monitoring and preventing manipulations with fuel.

Solution

DFM 100 AK, DFM 50 AK and differential DFM 250DK flow meters are installed on diesel power generators of main engines.

Data is gathered by GPS tracking device and sent to online platform via the Internet.

DFM flow meters mounted on ships

Result

Within two months after installation the customer achieved 58.6% reduction of fuel costs thanks to elimination of fuel theft and improved vessel engine operation.

Bus manufacturing

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Customer

Manufacturer of school, intercity and airport buses.

300+ employees **400+** airport buses made yearly **70+** years on the market

Machines

Three models of airport buses with a capacity from 60 to 130 passengers. Volume of fuel tank is 190 liters.

The tank has a non-standard shape (narrow at the bottom and wide in upper part). A float sensor is not suitable for fuel volume measurement is that complicated shape of a tank.

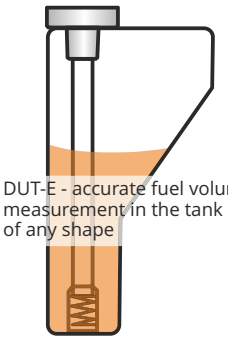
Task

Fuel measurement in complex-shaped tank.

Solution

Analog signal of DUT-E AF fuel level sensor is sent to standard onboard analog-to-digital converter. The signal is converted into digital format for integration with bus dashboard.

The customer requested fuel sensors of specific lengths, with a special mounting plate and pre-set configuration profile. This made it possible to mount sensors into tanks with minimum time costs – no sensor cut/extension necessary, no further configuration needed.



DUT-E - accurate fuel volume measurement in the tank of any shape

Result

The plant received an easy-to-install, reliable and accurate tool for fuel tank monitoring for affordable price. If an offer from other manufacturer (customized float sensor) had been chosen, the plant would have overpaid about 20,000 euros for each batch of each bus model.

Diesel-powered lighting masts

Customer

Mining company engaged in extracting various types of minerals: coal, iron and copper ore, gold, diamonds. Mining activities are carried out by both surface and underground methods.

12 000+ employees **1300+** bn dollars invested in equipment **7** countries of operation

Machines

Lighting masts are designed to illuminate quarries and mines, where stationary power supply is not supplied. The masts consist of fuel tank, diesel generator and LED lighting system.

A tracking unit is installed on the mast, which transmits data on GPS location and fuel in tank over satellite communication.

Task

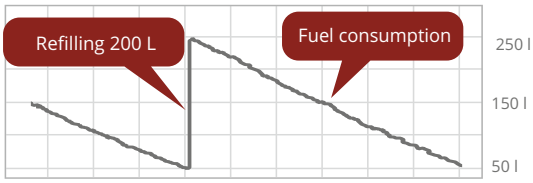
Online monitoring of fuel residue in tank, route optimization of tank refilling teams, scheduling maintenance of masts.

Solution

Fuel volume in tank is measured by DUT-E 485 fuel level sensor.

Fuel data (fuel level in the tank in mm, fuel volume in liters, ambient temperature) is sent to tracking unit. Data is transferred to the dispatcher using satellite connectivity.

When fuel residue reaches 10%, the dispatcher sends a team to carry out refueling and technical service of a mast. Thus, refueling and maintenance of a mast is done just in time.



Fuel volume in tank chart

Result

By obtaining operational information about fuel volume in tanks of the masts, it became possible to optimize routes of the teams. Technical team overheads decreased by 20%.

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Railway machines

Customer

Subdivision of national Latvian railway operator. The customer conduct engineering and maintenance services for rail network, supporting infrastructure and carries out safety inspections of the network.

2000+ km of railroad

10+ million kilometers of yearly transportation

40+ thousand tons of diesel consumer per year

Machines

Rolling stock includes track railcars, track machines, shunting diesel locomotives, ballast-distributing machines, straightening-tamping-straightening machines, gravel planners and other equipment.

Task

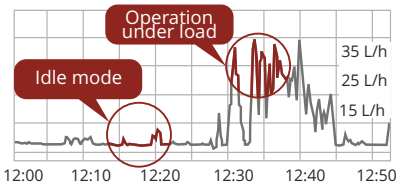
Engine operation time monitoring, fuel consumption measurement.

Solution

Telematics system is composed of DFM fuel flow meter and offline data recording unit.

Fuel flow meter precisely measures fuel consumption and engine operation time in various operation modes – idling, optimal, high load.

The data is stored in offline unit and later downloaded and sent to dispatcher workstation via Bluetooth access points.



Result

Analytical reports based on data from fuel monitoring system allowed company management to detect weak points in operation and increase KPI of machinery operation efficiency by 10%.

Agriculture

Customer

Agricultural enterprise engaged in the cultivation of wheat, corn, sunflowers, beets, legumes, livestock, milk and sugar production.

70+ employees

30+ machinery units

4500+ hectares of arable land

Machines

MTZ-80 tractors, 80 h.p., 130 liters fuel tank; John Deere 8310R tractors, 30 h.p., 695 liters fuel tank.

Task

Direct fuel consumption measurement, autonomous fuel data check.

Solution

DFM 100B fuel counters were installed on MTZ tractors, and DFM 250B on John Deere. Autonomous DFM fuel counters are equipped with battery and embedded display and does not require connection to electrical system of vehicle.

The display shows instant fuel rate and total fuel consumption data. The values are manually recorded in machinery operation journal.

Data falsification and counter tampering attempts are detected and recorded into non-volatile memory of DFM fuel counter and can be shown on the display.


Flowmeter on a John Deere tractor


Flowmeter on a MTZtractor

Result

After DFM installation, fuel consumption of tractors dropped by 20-30% (depending on the model and technical condition of engine). The costs for installing DFM fuel counters paid off in two months.

Diesel power-generators

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Customer

The company provides turn-key installation of GSM masts and towers, radio frequency repeaters, diesel generators, solar and hybrid batteries, and other equipment for telecommunication industry.

SDMO M126 diesel generator

Machines

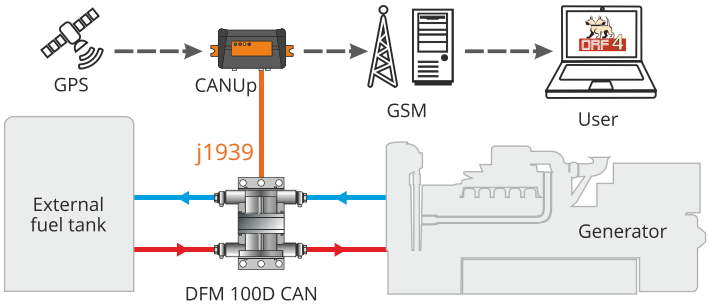
The majority of installed objects are located in remote areas of Nigeria, where main sources of electricity are diesel-powered generator sets. Mainly, 15 to 100 kVA equipment of SDMO, Perkins, York, Fireman is used.

Task

Accurate measurement of fuel consumption by power- generator, finding out remaining fuel in tank, and fuel drain prevention.

Solution

Fuel is supplied to the generator engine from an external tank through the feed line. Excess fuel flows back from the generator engine into an external tank through the return line. Differential fuel flow meter with two measuring chambers for feed and return lines is installed. Fuel data is received by CANUp gateway, which sends report to a web-based ORF4 telematics service.



Fuel consumption monitoring system composition

Result

Analysis of reports generated by ORF4 telematics service allowed optimizing fuel delivery schedule to the generators. The risk of work interruption due to running out of fuel is eliminated.
Draining from generator fuel supply system have stopped. This resulted in a 15% reduction in fuel costs.

City and intercity buses

Customer

Huge vehicle fleet in Scandinavia - over 700 buses cruising between and inside cities.


VDL Citea


VDL Futura


Volvo 9500

Machines

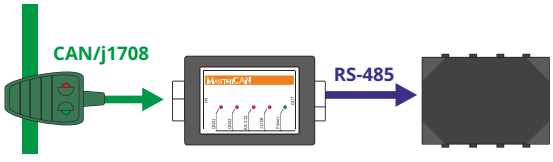
VDL city bus with a capacity of 100 passengers, equipped with 6.7 liters Cummins turbodiesel engine of 187 kW power.
VDL intercity bus for 45-60 passengers, 10.8 liters DAF turbodiesel engine of 300 kW power.
Volvo intercity bus with equipped with 45-60 seats, 7.7 liters Volvo diesel engine of 245 kW power.

Task

Implementation of Eco Driving system - monitoring of location and route, speed and acceleration; receiving data from tachograph; measuring diesel fuel consumption per trip.

Solution

Volvo buses are equipped with a 1708Crocodile contactless reader. It reads and transmits data from j1708 bus to the input interface of MasterCAN converter, which further transforms data for sending it to the telematics unit over RS-485.
In VDL buses, data is read from CAN j1939 bus. The transformation scheme is similar to that described above, but CANCrocodile contactless readers is used with MasterCAN data converter.



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

Result

As a result of the installation of the telematics system, fleet manager received the necessary information and developed driving quality requirements for implementation of Eco Driving approach. The goals of the Eco Driving system are increasing transportation safety, improving fuel economy, reducing repair costs.

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Diesel generators

Customer

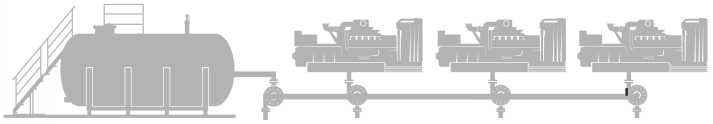
Specialization – installation of power generation systems for remote facilities, which include many energy consumers: forest industry, mining enterprises, agricultural companies.

Machines

Power supply for remote sites is provided by 3-4 diesel generators. A stationary storage of about 30,000 liters supplies all generators with diesel fuel. Fuel supply system includes main fuel tank, fuel lines and pumps that supply fuel to generator's supply (feed) tanks.

Task

Timely refilling of fuel tanks (main and feed), fuel consumption monitoring of each power generator's engine.



Stationary fuel storage

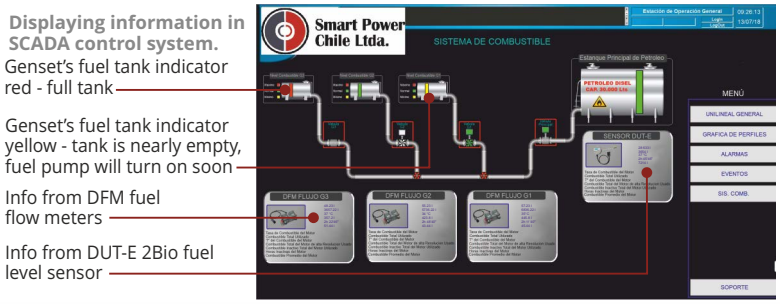
Solution

DFM 500D fuel flow meters with RS-485 Modbus interface are installed in fuel system of each generator. A DUT-E 2Bio fuel level sensor, also with RS-485 Modbus interface is installed in main fuel tank.

The flow meters transmit data on instant fuel rate, total fuel consumption, and generator's engine operating time. DUT-E 2Bio directly measures the volume of fuel in main tank. All data is passed and processed by SCADA – software and later transmitted to remote dispatcher.

(Feed tank indicator, red – full tank; Feed tank indicator, yellow – tank almost empty, pump should be started; DFM flow meter data; DUT-E 2Bio level sensor data).

Displaying information in SCADA control system.



Result

Provision of uninterrupted fuel supply to generator engines. Accurate information on fuel consumption and operating time in various operation modes allowed to optimize engine performance and reduce fuel consumption by 15%.

Tanker trucks

Customer

Oil refining enterprise. The entire production cycle from oil distillation to its delivery to gas stations and transportation companies.

Machines

Fuel trucks MAN, Mercedes-Benz and FAW. They have various designs - three-axle with a tank, two-axle with a three-axle semi-trailer, three-axle with a tank and a second tank on a trailer. Volume of transported oil products is 15 –45 cubic meters.

Different types of fuel - gasoline, kerosene, diesel fuel – can be transported in the same tank compartment at different times. Transportation distance – from 100 to 1000 km.

Task

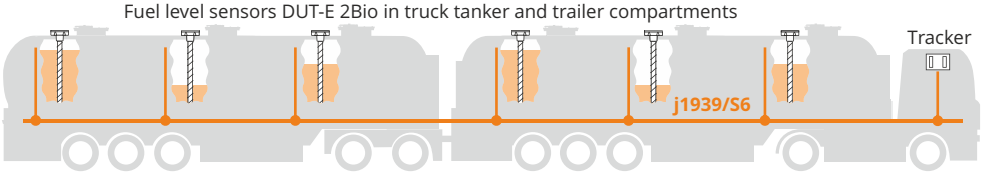
Prevent fuel theft and replacement of high-quality fuel with low quality liquids in compartment during trip.

Solution

DUT-E 2Bio differential fuel level sensor with CAN j1939/S6 interface is installed in each tank compartment. All sensors and telematics unit are connected into a single bus network with power supply, configuration, and data transfer over a single cable and from one point. A dispatcher sees total volume of fuel in a tanker truck and trailer and the level and volume of fuel in each compartment of a tank.

Alert on fuel type change is transmitted to the telematics unit, which immediately sends notifications by e-mail and / or SMS.

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



Result

After implementation of telematics system, the cost of insurance of cargo transportation decreased by 60%, fuel theft volumes dropped by more than 2 times, noteless fuel replacement during trip is now excluded.

Agricultural machinery

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Customer

A major producer of agricultural products in Uzbekistan - cultivation of grain crops, cotton, vegetables.


NewHolland tractors

Machines

NewHolland all-purpose tractors, 110 hp power, 240 l fuel tank;
TTZ cotton-growing tractors , 99 hp power, 110 l fuel tank;
Kirovets general purpose tractors, 300 hp power, 640 l fuel tank;
Case harvesters, 270-300 hp power, 570-750 l fuel tank.

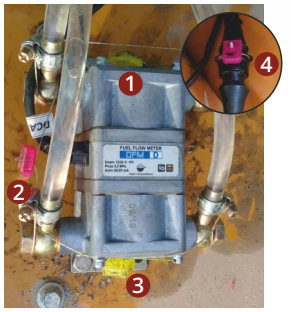

Case harvesters

Task

Equipment operation monitoring - cultivated area, movement routes.
Fuel consumption control - instant consumption of each unit, calculation of consumption per day.
Accounting for engine operation time - general and by engine operation modes.

Solution

Fuel consumption monitoring systems were installed on 300 units of the equipment. The systems include DFM D fuel flow meter and GPS-tracking unit that transmits information to a specialized telematics server.
The flow meter keeps counters of fuel consumption and operating time – data is available as total sum and split by operation modes. Flow meter body, its connections flanges and signal cable are sealed - outside interference is excluded.



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

Result

The telematic servers provides online information for each equipment unit: location, route and movement parameters, cultivated area, real fuel consumption.
Obtained data allowed reducing fuel costs by 30%.

Stationary fuel cisterns

Customer

United Nations World Food Program (WFP) Health Care Points in Yemen.


Fuel from fuel cisterns feeds genset (➡)

Machines

Stationary fuel tanks for supply diesel generators with fuel. Height from 1000 mm to 4000 mm, volume - from 800 l to 48,000 l, several shapes and sizes.


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

Task

Online measurement of fuel filling into each cistern, monitoring total amount of fuel in several cisterns that feed diesel to power-generator sets.

Solution

A fuel control system consisting of DUT-E 2Bio differential fuel level sensors with CAN J1939 output interface and CANUp telematics gateway was installed. All telematics equipment is combined into a single wired network using S6 Technology.
When the fuel quality changes, the level sensor automatically adjusts measurement readings. Fuel volume measurement inaccuracy remains less then ±1%.


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

Result

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.

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On-highway trucks

Customer

The company owns several dozen stores throughout the country. Delivery of goods between warehouses and shops is carried out with company's own fleet of trucks.

Machines

Chenglong H7 trucks, designed by Dongfeng Motor Corporation (China), is a main type of vehicles used. These vehicles have 6×4 wheel arrangement and are equipped with 6-cylinder 10.3 liters diesel engine. Engine power is 400 or 420 hp.


Chenglong H7

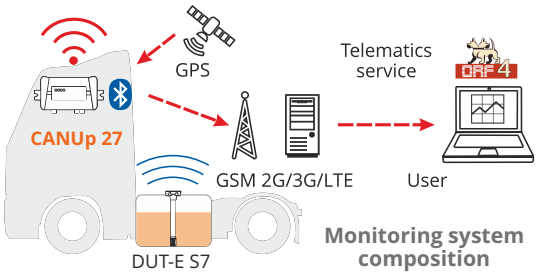
Task

Online tracking of truck location, route and speed, real-time fuel volume monitoring in trucks fuel tanks, getting notifications on fueling/draining.

Solution

DUT-E S7 wireless fuel level sensors were installed. The sensors directly measure fuel level inside the truck's tank. Fuel data is transmitted via Bluetooth to CANUp telematics gateway.

CANUp sends data to ORF4 web-based telematics service, where fleet manager can see the route, speed and location and study information on fuel usage – level inside a tank, alerts on refueling and siphoning. The telematics service generates Reports on fleet movement and fuel level change for each vehicle.



Monitoring system composition

Result

After telematics system was launched, fuel costs for on-highway trucks have decreased by 25-30% – driving quality was improved, while speeding, harsh acceleration and braking events were reduced. The trucks are not going off the route and fuel theft was minimized.

Mining and quarrying equipment

Customer

Vehicle fleet division of gypsum quarrying corporation


CAT 777D


Komatsu PC 2000


Komatsu PC 1800

Machines

Mining dump truck CAT 777D. 699kW CAT engine.
Crawler excavator Komatsu PC 2000. 728 kW Komatsu engine.
Crawler excavator Komatsu PC 1800. 2x 670kW Komatsu engines

Task

Nonstop receiving real-time accurate data on fuel consumption and flow rate of each piece of equipment – instant fuel flow rate, total fuel used and flow rates in feed and return lines, fuel used and engine running time in "Idling", "Optimal" and "Overload" engine performance modes.

Solution

DFM Marine flow meters with CAN j1939 interface were installed. Flow meters are placed in feed and return lines and interconnected using S6 Technology. Data is transmitted to CAN-port of a telematics box, and then sent to web-based service.

Each DFM Marine measures the flow rate in either feed or return line, and S6 Technology allows automatic calculation of difference between the lines to see what the fuel consumption by engine is. Komatsu PC1800 has two engines, so 4x DFM Marine were installed, but still only one CAN-port of telematics box is used thank to S6 Technology.

DFM Marine installed in supply ❶ and return ❷ lines

Result

T The data received from the telematics system is exported to software suite for calculating economic efficiency of production. Using data on fuel consumption per ton of extracted rocks, a digital econometric model of the enterprise will be built.

Construction machinery

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Customer

Construction company engaged in road building and maintenance.

Machines

JAC and Sinotruk dump trucks (205 – 375 hp engine, 250 – 350 l fuel tank).
Lonking front-end loaders and excavators (140 –150 hp engine, 250 – 380 l fuel tank).



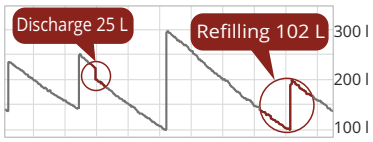
Task

Prevention of fuel theft from tank, online route and location tracking of dump trucks and construction vehicles.

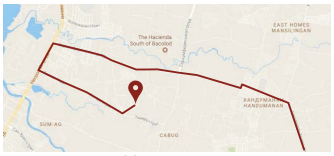
Solution

To solve the above tasks, DUT-E GSM fuel level sensors with built-in GSM modem and GPS module were installed in fuel tanks of the vehicles.
DUT-E GSM combines fuel level sensor and telematics unit in one device. DUT-E GSM sends data on:

- fuel status in tank - level in mm, volume in liters, refueling and draining;
- route, location and entering/exiting pre-defined geozones of the equipment.



Change of the fuel volume in tank


Route and location monitoring

Result

Fuel economy after installing DUT-E GSM reached 20% of previous consumption volumes. Cases of fuel draining from fuel tanks and misuse of trucks have stopped. Also, productivity of labor increased due to increase of labor discipline.

Fuel storages

Customer

Construction company. Portfolio includes highways, airports, city roads, asphalt factories, lines for crushed stone production and other.

1700+ employees **280+** machinery units **5** building materials plants


Machines

Stationary tanks and tankers are used for refueling road-building equipment.
Stationary containers have a volume of up to 50,000 liters.
Fuel tankers with a single-section fuel tank have a volume of 3,000 liters.

Task

Accurate accounting of delivered fuel, taking in account climatic conditions (daily temperature fluctuations up to 40 degrees). Location and route monitoring of tankers for route optimization.

Solution

To solve the above tasks, DUT-E GSM fuel level sensors with built-in GSM modem and GPS module were installed in fuel tanks of the vehicles.
DUT-E GSM combines fuel level sensor and telematics unit in one device.
DUT-E GSM sends data on:

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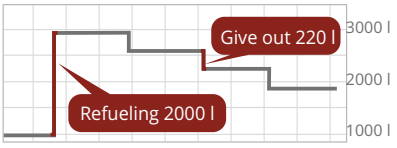
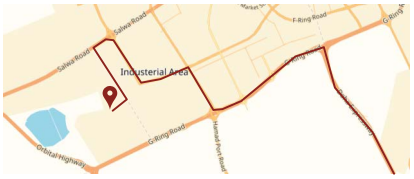


Change of fuel volume in fuel tanker's cistern



Fuel tanker's route monitoring

Result

45% costs decrease for fuel transportation to manufacturing sites thanks to route optimization. A large amount of working hours was saved due to the elimination of manual procedure of measurement and recalculation of fuel density.

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