nuts »
by neeco

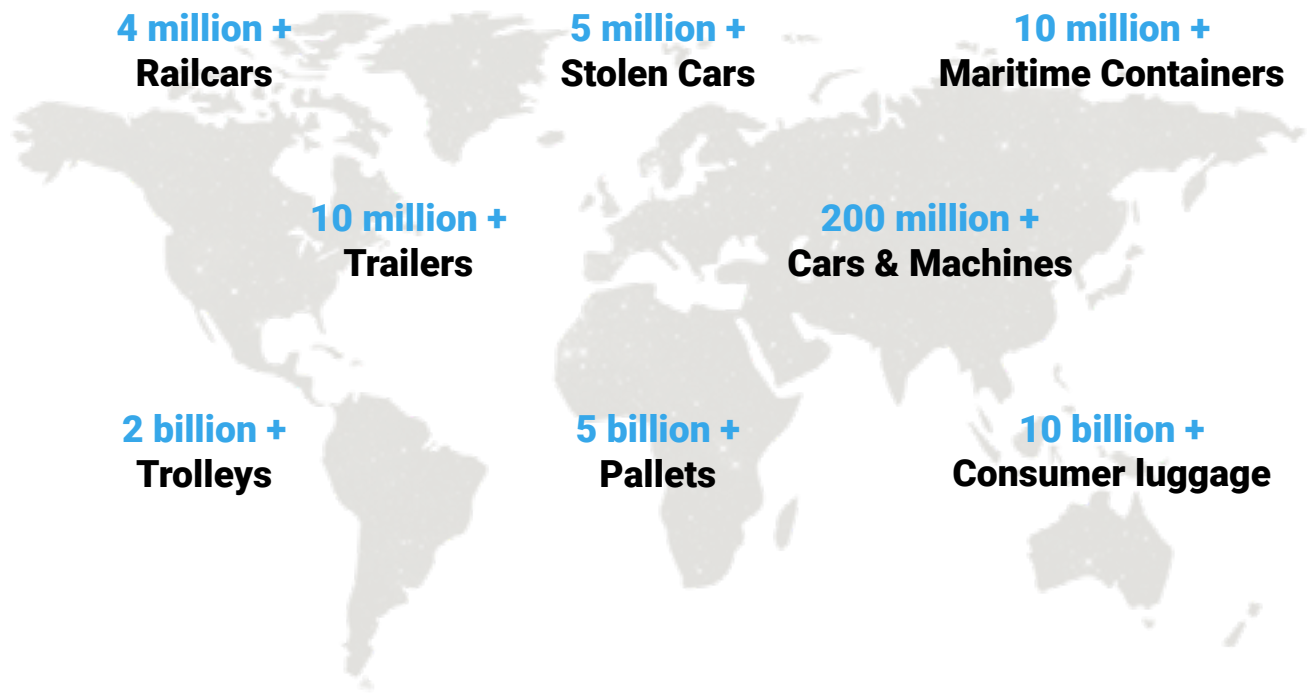# Neeco Universal Tracking System

developed by:

neeco
GLOBAL ICT SERVICES

www.nuts.neeco.com

IoT Opportunities around the world

4 million +
Railcars

5 million +
Stolen Cars

10 million +
Maritime Containers

10 million +
Trailers

200 million +
Cars & Machines

2 billion +
Trolleys

5 billion +
Pallets

10 billion +
Consumer luggage

Our customers have told us what is bothering them...

Has my asset arrived yet?

Theft & abuse protection?

Does the driver follow the route?

Availability around the world?

Where is my asset and how to pick it up?

Predictive maintenance?

Effective maintenance of tires, oil, buggies?

Route planning?

Is the cargo OK?

Any damage?

Complexity and high cost of solution?

Cables, buttons?

Advanced Global Tracking & Monitoring Solution for:

- Trucks
- Trailers
- Cars
- Rail cars
- Forest machinery
- Containers
- Aircrafts
- Construction machinery
- Motorbikes
- Any other moving asset

Any type of asset that's part of your business needs to be managed. The Neeco Universal Tracking System (NUTS) provides unique solutions for online monitoring without the need for professional installation by simply using strong magnet to mount the unit wherever it is needed. You can easily set up all the features using a web portal that is accessible from a computer, smartphone, or tablet.

In addition to GPS localisation, which is now a standard service, NUTS allows you to track other parameters such as impacts, tilting, acceleration, vibration, humidity, air pressure, or temperature. Advanced online monitoring gives you a complete overview of your assets and it allows you to use them more efficiently. Localisation of assets, usage reports, theft prevention, anti-tampering, security, etc. - you get it all with NUTS.

How does it work?

NUTS consists of:

1. A GPS unit with a three-axis G-sensor for motion and tilt detection
2. A responsive web portal in 16 languages
3. An embedded global SIM
4. A mobile app for iOS and Android

Download on the App Store

GET IT ON Google Play

The whole solution is available online in real time through the web portal or mobile apps. There is also the possibility of API or web hook data transfer. Data are backed up on a secure server for several years.
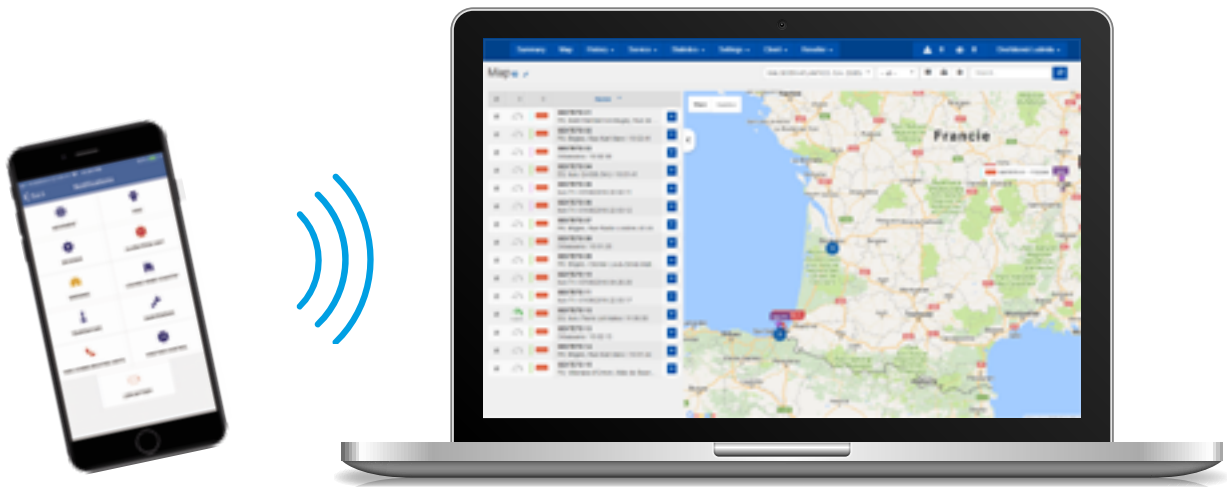
Every unit has an internal battery with extreme capacity that can be recharged via USB or affixed to the power source of the asset. The core features remain consistent across all units, with the battery size being the only variable. The size of the unit depends on the needs of the given solution, with the battery life reflecting the set time interval of tracking.

GPS units also consist of other sensors; for example, for measuring temperature, air pressure, or humidity. These sensors are triggered automatically, so there is no need to press any buttons or avoid monitoring these values.

S-unit

M-unit

L-unit

NUTS Measures and Transmits

- Exact position - using GPS and Glonass satellite systems GSM localisation
- Speed and direction of movement temperature, air pressure, humidity acceleration, and tilting
- Vibration pattern
- Battery voltage and status
- Driver or pilot behaviour
- Crash or any kind of impact

Options for Setting Alerts

You can use various system features to set up alerts as needed. The system will inform you when the unit is starting to move, if it is exceeding maximum speeds, or when it is arriving at the preselected location. Notifications are delivered in real time so that you can respond immediately to the situation, such as preventing property loss or other inconveniences. Alerts can be set for certain days and hours to conform exactly to your needs.

Statistics and Reports

Every type of measured data can be reported. The system allows you to create as many statistics as you need, e.g. analogue values from sensors, speed comparison, driver comparison regarding mileage, visited countries overview, detailed logbook, maximum speed, fueling and operating cost, etc. Reports can be sent automatically at a preselected frequency such as once a week, once a month, or every day. The availability of statistical output depends on the type of unit installed and its specific settings.
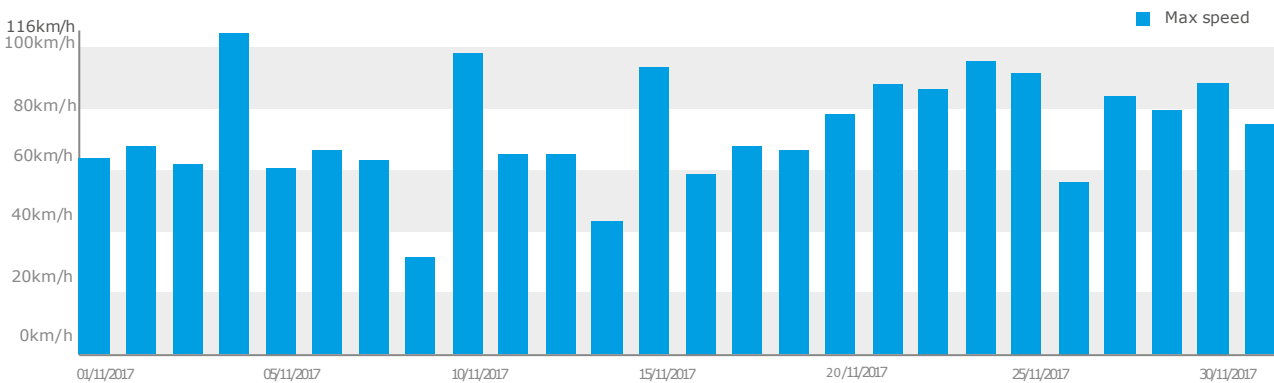
Distance moved (on business / privately), Michale Hekrle - 4J45700
From: 01/11/2017, 00:00:00 To: 30/11/2017, 23:59:59
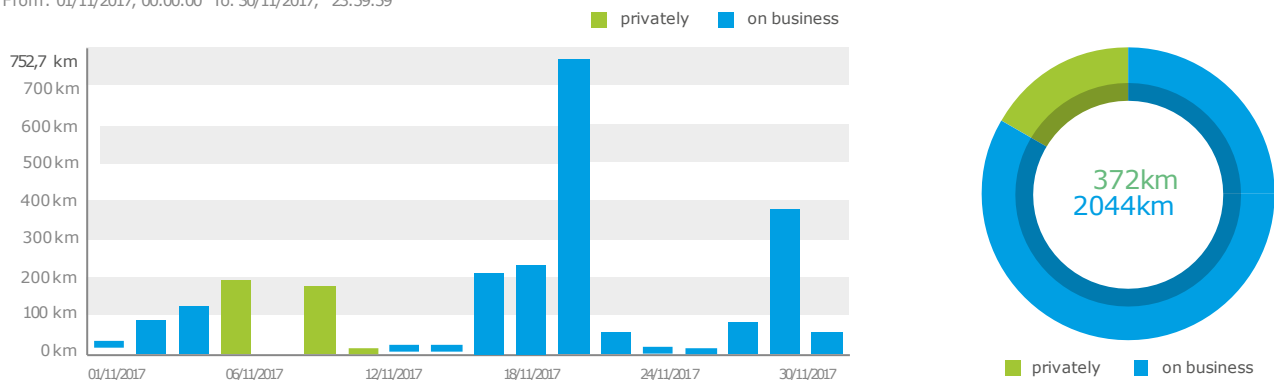
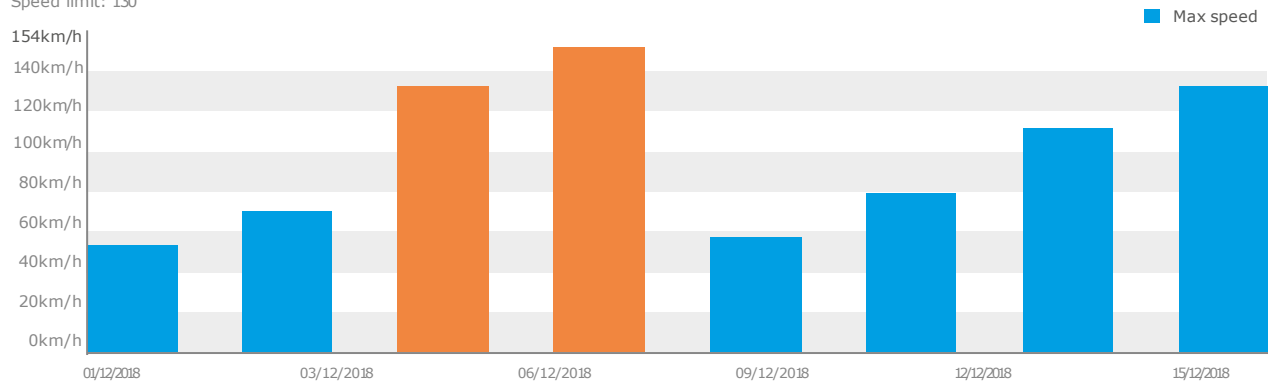### Maximum speed, Nissan - 5AC 6377
From: 01/11/2017, 00:00:00 To: 30/11/2017, 23:59:59

Maximum speed, DEMO - 7721797
From: 01/02/2018, 00:00:00 To: 15/02/2018, 23:59:00
Speed limit: 130

NUTS maps
Unique route planning

3 simple steps to success:

1. Create a route

2. Send it to a driver

3. Use navigation

3 systems in 1 package:

- Fleet management system

- Navigation with real-time trip planning

- Driver application

Why is NUTS unique?

- The longest battery life
- Unlimited data communication
- Unlimited geozones
- Unlimited users and notifications
- New configuration within 5 WD
- Tailor-made configuration for each type of asset
  - aircraft, railcars
- Map layers with airports, balloon ports, heliports, rail stations
- Remote GSM activation and deactivation
- Portal in 16 languages
- White-labeling for customer
- All configurations over the air
- Route planning and driver navigation
- Temperature range from -31ºC to 65ºC

Summary of Key Advantages

- Tailor-made solution for any case and customer
- E2E branding for resellers and larger organisations
- Full-service support 24/7/365
- Full pre & post-sales support
- Capex and Opex models, contract up to 60m
- New configuration done within 5 days
- No limits - data, notifications, users, geofencing

	Feature	NUTS	Portable IoT Competition	Installed competition
Installation	Portability	✓	✓	✗
	Professional installation/unnistallation req.	x/x	x/x	✓✓
	Placed by customer by needs	✓	✓	✗
	Hidden installation	✓	✓	✓
	Installation below metal surfaces	✓	✗	✗
	Field engineers in more than 160 countries	✓	✗	✗
Battery Networks	Online availability	✓	✓	✓
	Availability more than 15,000 km online	✓	✗	✓
	Availability more than 50,000 km per 5 min	✓	✗	✓
	Availability more than 100,000 km per 10 min	✓	✗	✓
	Stand-by battery compension per month	1,40%	12%	*battery for a week*
	Online alerts	✓	✓	✓
	Availability on every mobile network	✓	✗	✗
Support	New configuration within 5 WD	✓	✗	✗
	24 / 7 / 365 Support	✓	✗	✓
	Pre-sales support by dedicated FTE	✓	✗	✗
	Post-sales support by dedicated FTE	✓	✗	✗
Features	Automatic start activation	✓	✓	✓
	Current location and status	✓	✓	✓
	Logbook	✓	✗	✓
	Travelling on map by time	✓	✗	✓
	Driver identification	✓	✗	✓
	Business/private trips	✓	✗	✓
	Vehicle activity (shocks, tilts)	✓	✓	✓
	Driver evaluation	✓	✗	✓
	Vibration - 8G, 100Hz	✓	✗	✗
	Current fuel level	*for fee*	✗	*for fee*
	Car diagnostics (also bus)	*for fee*	✗	*for fee*
	Service inspections	✓	✗	✓
	Temperature measurement	✓	✓	*for fee*
	Waterproof - outdoor use	✓	✓	✗
	Europe included	✓	✗	*for fee*
	World coverage	✓	✗	*for fee*
	Alerts/notifications	✓	✓	✓
	Geozones	✓	✓	✓
	Unlimited settings of geozones	✓	*0 or max 10*	*0 or max 32*
	Unlimited user accounts	✓	✗	✗
	Unlimited communication	✓	✗	✗
	Manual drawing of geozones	✓	✗	✓
	Information for customers	✓	✗	*for fee*
	Humidity, atmospheric pressure	✓	*sometimes*	*for fee*
	3-level user management support	✓	✗	*sometimes*
	Remote control	✓	✓	✓
	Open APU and Webhook	✓ NUTS	✓ ✗	✓ ✗
	Number of language versions	16	1 or 2	5 or 6
	Up to 30 days on a single map	✓	✗	✗
	Functionality regardless of OS	✓	✗	✓

What can be tracked?
Segments and Use Cases

Every industry has its specific needs and we know what is most important:

Agriculture
seeding machines, harvesters, tractors
- Workforce & asset planning
- Asset utilisation
- Seasonality

Aircraft
small private planes
- Maintenance
- Security
- Asset management

Construction
excavators, rollers, loaders, graders
- Dispatcher view
- Workforce & asset management
- Adherence to workflows

Predictive Maintenance
cranes, harvestors, drilling machines, railcars
- Asset protection
- Reduction of maintenance
- Costs precise measuring 8G@100Hz

Railways
railcars, tank cars, locomotives
- Railcar utilisation
- Maintenance
- Cargo protection

Waste Management
waste disposal machinery, containers
- Navigation & route optimisation
- Location and coverage
- Manipulation

Transport & Logistics
Trucks, trailers, containers
- Logbooks
- Adherence to the prescribed route
- Selected areas (geozones)
- Cargo status - temperature, shocks
- Route planning
- Driver behaviour

Rental Companies
scooters, cars, motorcycles, carts
- Portability
- Usage
- Security
- Maintenance
- User & asset behaviour

Agriculture

The work of agriculture and forest management companies depends to a great extent on the season, which means that companies do not use their machinery throughout the whole year. Therefore, they need flexible equipment which will enable them to use a product based on their actual needs.

What can NUTS monitor?

- Kilometres travelled
- Hours worked
- Vehicle movement (arrival at a work performance location, arrival back at the garage)
- The coordinates of machinery at a particular time (in case there is a need for service intervention)
- Tilting of machinery in view of the variation of the landscape and notification in the event of a roll-over of machinery
- Breaks
- How the work was done

What benefits does NUTS offer?

- A complete overview of machines and their use
- Flexibility of use for machinery in use at a particular moment
- Checking use of machinery for non-work-related purposes
- Checking compliance within the assigned work period
- Protection against theft of machinery
- The perfect tool for quick service intervention thanks to navigation
- Maximum coverage thanks to the addition of a GDSP card for places where there is often poor signal (fields, forests, meadows, etc.)
- 3D view of managed land (hilliness of terrain, elevation profile, etc.)
- Temperature sensors are able to draw attention to the risk of fire
- Motion sensors can draw attention to the theft of wood
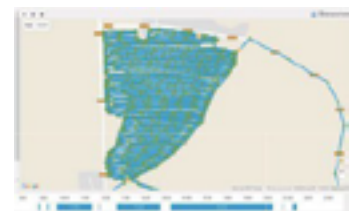
Aircraft

What can NUTS offer for aircraft companies above standard tracking solutions?

- Tracking of position, direction, speed, and altitude every 30s
- Signal up to an altitude of 2,200 metres
- Entry of 10,000 events if mobile signal is not available
- Unit battery life of at least 50 hours of flight time plus 30 hours of operation within 2 months
- Recognition of aircraft movement at the airport, including takeoff and landing
- Highly sensitive sensors to detect aircraft shift in hangars
- The exact position of all kinds of assets
- Implementation of maps with coordinates
- Impact analysis – proper handling of assets
- Maintenance overview

What do aircraft companies appreciate the most?

- Units constructed to handle acceleration / G-force as high as 8G
- Portable devices with extreme battery life and the possibility of hidden installation
- Remote configuration of sensors settings
- Detection of entry into restricted areas
- Global coverage
- Units do not electromagnetically affect any other aircraft device

What other benefits does NUTS bring?

- Prevention of company property misuse by employees or customers
- Protection against theft
- Precise configuration developed specifically for the aircraft segment

Monitoring of Small Aircraft
/case study/

International companies responsible for airspace monitoring and pilot training have finally found a valuable solution for deployment in small aircraft.

Challenge

- Maximum 30s interval tracking of position, direction, speed, and altitude
- Battery life of the unit of at least 50 hours of flight time and 80 hours of operation within a time interval of at least 2 months
- Mobile signal up to an altitude of 2,200 metres
- Units constructed to handle acceleration/G-force as high as 8G
- Minimum entry of 10,000 events if mobile signal is not available
- Global coverage for data availability
- Highly sensitive sensors to detect aircraft shift in a hangar
- Implementation of maps with airport coordinates
- Recognition of aircraft movement at the airport, and during takeoff and landing
- Map layer with airports and Touch & Go monitoring

Needs

- Complete air-traffic monitoring
- Detection of entry into restricted areas
- Pilot instruction with back-to-back flights for study materials
- To provide regular service on a set date
- To ensure aircraft control in the hangar to avoid damage or change of location
- G-force reporting by unique tailor-made configuration according to airplane type

| Event type	Text	Guarding	Address	Alarm time
Accident	crash_g_force=2.08, x=-2.04, y=0.28, z=0.24, gps=56.479200N 59.776800E		RU, Лесовозная дорога на Платониду и Шунут с Мариинска	30/05/2019 11:45:50

Requests

- Portable unit
- Fixed-mount unit without installation and electromagnetic effect on internal devices
- Certified global communication protocol
- Unlimited data to communicate with the unit
- Remote configuration (OTA) of sensor settings
- Multicarrier SIM for optimal data availability

Solutions and Results

NUTS provides:
- Continuous data transmission from 7 to 10 s up to 2,200 metres above sea level by location
- 3D visualisation of flights for study materials
- Detection of entry or exit from monitored areas
- Implementation of more than 57,000 coordinates of airports by country or location
- Immediate reaction in case of theft or aircraft movement
- Battery life of the NUTS L unit for 130 flight hours and 180 hours of operation
- Battery life of the NUTS M unit for 70 flight hours and 100 hours of operation
- Data availability of 99.41% online, the rest with delays due to missing GSM coverage
- Webhook implementation for communication with no delay
- Full maintenance module to ensure all service tasks
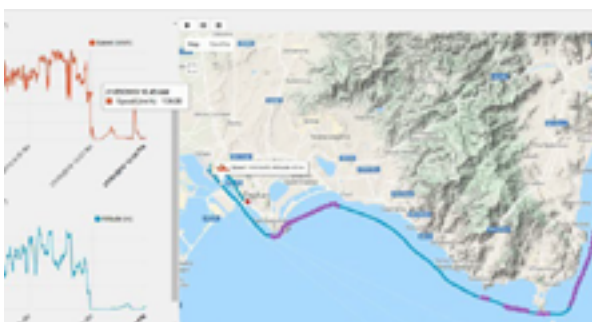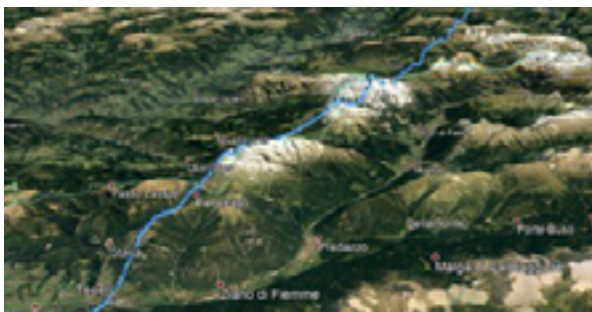
These facts have been identified:

- Special modules with sensors provided valid data which are on the server in up to 10 s in 99.41% of cases.

- In 100% of cases, the modules reported movement, location change in a hangar, or entry/exit of the monitored area.

- Multicarrier IoT sim provided unmatched data availability.

- 13% of pilots breached the restricted area within 1km of the entrance. After being presented with these results, the number of incidents dropped to zero.

- NUTS units provided data over the entire service interval. The L unit, in particular, can provide data for more than 2 service intervals and has been selected for its sharp operation, providing full-flight monitoring as well as ground monitoring.

Summary

The special sensor modules provided valid data which helped improve internal processes such as aircraft maintenance, simplified external monitoring with simple installation for external aircraft, and has made the entire process more effective. Data availability up to 10s or full implementation via API or Webhook. Prohibited entrance to the restricted areas in the pool of monitored aircrafts. Unbeatable price for modules, monthly platform and data use.

Construction

What do construction companies need to know?

- The exact position of all their assets (excavators, containers, trucks, heavy machinery, etc.)
- Whether the material was delivered to and unloaded in the right place
- The optimal route for container delivery and pickup
- Complete overview of the company's property
- Construction area movement analysis
- Impact analysis – proper handling of assets
- Maintenance overview
- Whether the container/machinery has always been used in a contractually agreed location

What do construction companies appreciate the most?

- Portable devices with extreme battery life with the possibility of hidden installation
- The ability to monitor excavators, machinery, containers, trucks, and employees without the need for fixed, complex installation
- The ability to check delivery of materials to the customer
- Dispatching system for drivers with route optimisation
- Remote configuration of sensor settings

What other benefits does NUTS bring?

- Prevention of company property misuse by employees
- Protection against container theft
- Unlimited logbook

Spanish Construction Company with 360 Trucks
/case study/

One of the biggest construction companies in Spain, with 360 trucks, needed to reduce losses caused by drivers.

Challenge

- Up to 37% of drivers illegally sell a part of the load (stones, pulp, recyclables, sand).
- The losses on the sales of goods are more serious than losses caused by theft of fuel.
- The company uses lots of types of trucks.
- The company also hires external suppliers with drivers during the season and they need to be monitored effectively.
- The trucks move over all Spain and it is necessary to have a solution with GSM coverage and GPS availability.
- Drivers are smart; they are able to find any electronic device which is plugged into the truck.
- Notifications must be set up by the responsible party – every project has a responsible person or dispatcher who monitors what happens.

Needs

- To provide an overview about inappropriate behaviour of the driver when he violates the regulations and carries a load of cargo where he should not
- To protect assets and mitigate the financial impact caused by theft
- A cheap solution for monitoring external drivers who help the company during the season or a project
- To improve the availability of trucks in places where they are needed - road repair, construction work– and avoid delays caused by dishonest driver behaviour

Requests

- Portable devices
- Tailor-made configuration per truck, as many trucks have different body types and a different angle tilt.
- Remote configuration (OTA) of sensor settings for updates
- Robust units with hidden installation – driver mustn't see the unit on the body.

- Multicarrier SIM for the best mobile coverage
- Scalable notification system for customisation by time, date, dispatcher, and truck
- Notifications must be available in real time and displayed with the name of the truck, the exact GPS position and time of the event, and an alert description.

Solutions and Results

NUTS:

- Provides the capability to monitor thefts within 3h and 47m after installation
- Provides devices undetectable by driver
- Can be installed in 2m and 18s
- Means no installation costs when using external companies
- Showed a 26.3% decrease in thefts when compared with pre-installation measurements
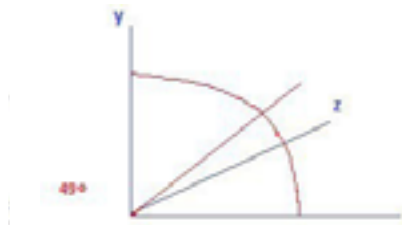
These facts have been identified:

- The largest number of losses are caused where the building site is near a village or a city where they often need material to repair their own infrastructure.
- There is no need to deploy devices on all trucks. As soon as the other drivers found out that there was a monitoring system, their behaviour, downtime, and time spent on breaks improved. Based on testing, it is possible to say that it is enough to fit 50% of the trucks to see significant improvement.
- Hidden/secret installation is a must.

Summary

The special sensor modules provided valid data which helped improve internal processes, simplified external monitoring, and made the entire process more effective.Thanks to the accurate GPS measuring of position and 100% data availability, the company has total control over their cargo and their trucks. Due to very rapid response time and data transmission, only NUTS L or L + units are recommended. NUTS L is cost effective: 1 truck of sand / grit (30 tons) costs approx. €450. NUTS L costs €335 for the first year, and €105 the next. The company has 20 cars on the construction site and up to 30 fully loaded cars disappear per day, which can now be prevented with NUTS.

Railways

What do railway companies need to know?

- The exact position of all their railcars
- Whether the railcar has always been in a contractually agreed location
- Complete overview of maintenance
- Whether the railcar coupling is performed at a proper speed
- Complete overview of goods transport - whether there was any event leading to any freight damage
- Mileage overview
- Information about crossing borders

What do construction companies appreciate the most?

- The ability to monitor all types of railcars without the need for complex installation
- Portable devices with simple installation and extreme battery life
- The ability to inform customers about when they can expect their goods in order to deliver increased customer satisfaction
- The ability to reduce operating costs associated with customer shipping and delivery inquiries
- NUTS features in 16 language versions, so all European branches can access data in their mother languages

What other benefits does NUTS bring?

- Prevention of the loss of railcars
- Online access through web portal or mobile app

Railway Transport and Engine Driver Behaviour
/case study/

This delivery company operates more than 250 railcars and dozens of lorries to transport goods within Spain and France.

Challenge

The company does not know where all their assets are, nor the exact mileage of the railcars. This lack of knowledge is impacting not only proper usage but also maintenance costs, as they are forced to sometimes perform unnecessary service. Maintenance costs are also influenced by frequent repairs due to huge wear on the brake system caused by harsh braking by engine drivers. The company suspects that drivers often ignore the braking start signs, but does not have any relevant proof of it, so they can't take preventive measures. Moreover, driver behaviour is suspected of causing damage to the goods being transported and to the railcars themselves; for example, when coupling at the wrong speed, railcars' bumpers are damaged. Another challenge is that the company can't properly inform their end customers about the location of their goods, so their operations centre is overloaded with calls and emails from customers. This inability has a negative impact on the overall perceived quality of transport.

Needs

- To verify the suspicions of regulation non-compliance by its engine drivers, such as ignoring the braking start signs, which causes great wear on the brake system
- Gain greater insight into goods transport to reduce operating costs, including the location of all assets and their usage
- Check the coupling speed and impact – railcar coupling must be performed at a maximum speed of 5 km/h and a maximum shock of 4G
- To better inform its customers about when they can expect their goods in order to deliver increased customer satisfaction and reduce operating costs associated with customers' shipping and delivery inquiries
- Provide its customers with a transport quality guarantee through which the customer can see that there was no transport event that would lead to any freight damage

Requests

- Portable devices
- Remote configuration (OTA) of sensor settings
- Non-disposable sensors or units
- A multilanguage system

Solutions and Results

NUTS provides the capability to monitor:

* Impacts during transportation, from handling on the company's premises (including railcar coupling conditions) up to goods handover to the customer
* Railcar travel distances with exact locations to identify railcar location, and features the ability to inform the customer about the expected arrival time of goods at a specified location
* The engine drivers' driving style with exact data on where and how brakes were applied, including map data display

The deployment of the entire NUTS ecosystem supplied the delivery company with important data on the transport of its goods and, in particular, on the engine drivers' driving style and behaviour.

These facts have been identified:

* Special modules with sensors provided valid data that accurately determined the engine drivers' behaviour and determined the location of intense breaking, not only upon arrival at a station, but away from it as well.
* The values were set per the customer's requirement to match the realities of the railways in Spain and France. Approx. 40% of braking was done later than it should have been.
* Railcar coupling was over the maximum speed and shock limits 67% of the time.
* The NUTS system regularly provided the delivery company's customers with information on transport status and delivery notifications. It also allowed regular administration to the existing customers, thus reducing the burden of operators. There was a 30.8% decrease in customer calls requesting delivery details per month.

Summary

The special sensor modules provided valid data which helped improve internal processes, simplified external process monitoring, and made the entire process more effective. Thanks to the accurate measuring of values working together with event GPS data, it was possible to supply findings and quickly apply the necessary improvements. The NUTS system features 16 language versions, so all European branches could access their data in their mother languages without placing any unnecessary burden on the operator. Device installation takes 2.5 minutes and the battery replacement 3.5 minutes. Customers are satisfied with the device's ease of use without any impact on their processes.

Transport & Logistics

What do transport & logistics companies appreciate the most?

- The ability to monitor freight, vehicles, and employees without the need for complex installation
- The ability to check compliance with the planned route and monitor stops
- The ability to use the product only when freight is en route
- The ability to check compliance with previous points, when freight has left the warehouse, when it has crossed a border, when it has arrived at the customer's location, etc.
- The ability to check the delivery of freight to the customer by the contractually agreed deadline; NUTS makes it possible for the driver to inform the client about potential changes or delays and thereby avoid unpleasant situations.
- The ability to transfer the module without the need for installation and the risk of contractual fines and related flexibility for selection of the vehicle/freight that will be monitored
- Availability of information about vehicle and freight coordinates without limitations on data and availability of the signal
- Coverage throughout the EU as part of service with no limitation of data. And thanks to GDSP, NUTS also provides the greatest signal availability among all solutions on the market
- The ability to inform the customer about the status of a consignment
- Relief for dispatchers, who spend up to a third of their time resolving customer queries regarding consignment status. NUTS makes it possible to inform customers regularly.
- Support during compliance with legislative rules for completion of the trip log
- Extreme battery life

What other benefits do companies get?

- Checking of freight shifting during transport and avoiding potential damage to it. Thanks to monitoring, the company can guarantee that the goods will be transported without accident. This guarantee is typically important for transporting structures, electronics, etc.
- The ability to monitor the temperature of freight thanks to temperature sensors in the Maxi module; NUTS can report fluctuations in temperature around individually set boundaries. This function is typically important for companies that carry food or other goods susceptible to changes in temperature (Coldchains).
- Prevention of the misuse of company property by employees
- Prevention of false reporting of insurance claims. NUTS offers transport companies evidence of the coordinates of vehicles in the event of a false allegation of accident or property damage.
- A complete overview of the company's property and clients

Gate and Door Transportation

/case study/

A company producing industrial gates and doors is experiencing huge financial losses due to poor quality transportation and goods handling. Damaged products are discovered as they are unpacked at the customer's premises.

Challenge

Currently there is no solution in use by the company for monitoring conditions during transportation (preparation, loading, transport, unloading). They cannot identify whether the damages are caused by ignoring the transport rules or aggressive driving, e.g. abrupt braking, very sharp cornering, etc. The goods being transported weigh several hundred kilograms; therefore, any impact can cause damage.

Needs

The door supplier wishes to identify the quality of the logistics chain components to the point where the goods are handed over to the end customer, including:

- Impact during transportation – measurement of any impact exceeding 3G with exact data on where and when, and the exact force of impact
- Temperature – reporting when the goods are subjected to thermal impact in cases where temperatures exceed 40°C
- Transport mode – measurement of when very rapid braking or very sharp turning impacts the placement of the goods by shifting them and causing damage

Requests

- Online data analysis, up to 5 minutes from an event, all over Europe without any sent data limitations
- Remote configuration (OTA) of sensor settings
- Non-disposable sensors or units
- A multilanguage system for all European branches

Solutions and Results

The deployment of the entire NUTS ecosystem supplied important data on goods handling and shipping to the door supplier. These facts have been identified:

• Incorrect goods handling on the company's premises resulted in screw loosening since goods were not smoothly placed on the semi-trailer but were released from a specific height. As a result, the measured impact upon contact with the semi-trailer exceeded 7Gs.

• Temperature measurement has shown that goods were placed incorrectly on the company's premises. They were exposed to direct sunlight resulting in the temperature inside the package exceeding 40°C.

• During transport, the carrier met all requirements. Lorries drove over rail crossings at the specified speed as well.

Summary

The special sensor modules provided valid data which helped improve internal processes, simplified external process monitoring, and made the entire process more effective. Thanks to the accurate measuring of values working together with event GPS data, it was possible to supply findings and quickly apply the necessary improvements. The NUTS system features 16 language versions, so all European branches can access their data in their mother languages without placing any unnecessary burden on the operator.

Predictive Maintenance

In the past, accelerometers were primarily used for heavy, high-end machinery such as windmills, industrial pumps, compressors, excavators, crushers, and the like. Driven by increased automation, demand is rising on high-volume, smaller systems such as machine spindles, conveyor belts, sorting tables, and machine tools which require better predictive maintenance (PdM).

Machine downtime in these applications is a critical consideration in terms of customer experience and profitability.

NUTS offers a unique solution for monitoring and evaluating vibration patterns of work machines and equipment. Simple installation using strong magnets and extreme battery life of the device will deliver the right solution for your business.

Characteristics:

- Measuring in 3 axes (X, Y, Z)
- Fixed scanning interval
- Defined interval in operation
- Monitoring of limit values
- High resolution and dynamic range
- Full scalability

- Long-term stability
- No environmental impact
- Operating temperature range
- Online data through Webhook
- Wide configuration range
- Portable devices with no wired installation

Predictive Maintenance
/details/

How does it work?

- Based on vibration and frequency monitoring, we can tell when machine breaks down or runs at a less-than-optimal speed. We can also detect the poor state of roads, rails, or other infrastructure.

$d = ag/(2*pi2*f2)$ ...... derived from omega=f*2pi; ag=r*omega2; d=2r; g=9.81m/s/s
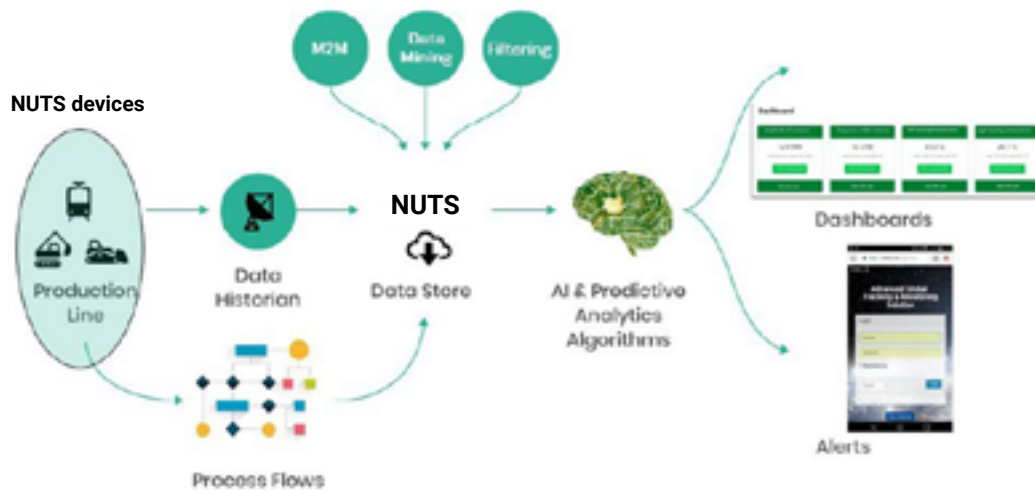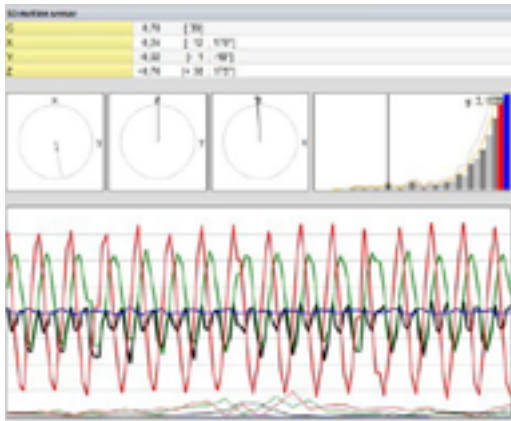
Are there any other benefits?

- GPS and GSM localisation
- Monitoring of impact, tilting, humidity, atmospheric pressure, and temperature
- Unlimited acccess
- Remote settings

Waste Management

What do waste management companies need to know?

- The exact position of all their assets (containers, trucks, etc.)
- Whether the container was delivered to the right place
- The optimal route for container delivery and pick up
- Complete overview of the company's property
- Impact analysis – proper handling
- Maintenance overview
- Whether the container has always been in a contractually agreed location

What do waste management companies appreciate the most?

- Portable devices with extreme battery life with the possibility of hidden installation
- The ability to monitor containers, trucks, and employees without the need for complex installation
- The ability to check delivery of the container to the customer
- Dispatching system for drivers with route optimisation
- Remote configuration of sensors settings

What other benefits does NUTS bring?

- Prevention of the misuse of company property by employees
- Protection against theft of containers
- Unlimited logbook

International Waste Company

/case study/

This waste company operates in many Europeans countries. In each country, this company is responsible for more than 5,000 containers used for construction waste and other major tasks.

Challenge

- The containers are rented for 6 or 12 months. Customers do not always follow the rules and sometimes move the containers; it is then necessary to find them, which is a time consuming and costly activity.
- The containers are often stolen by people from the neighbourhoods where they are placed. This creates a huge impact on cashflow, as one container can cost up to €4,500.
- The containers are placed everywhere they are needed, regardless of current GSM coverage, etc.
- Company drivers require route planning to retrieve containers. It is very expensive to pick up containers when drivers must visit many places and rely on their past experience to find missing containers.

Needs

- To have an overview of where the containers are located
- Check and reveal impacts higher than 5G during transport or handling of the container
- Protect assets and to mitigate financial impact caused by theft
- Optimise route planning and reduce the amount of time needed to retrieve containers

Requests

- Portable devices
- Remote configuration (OTA) of sensor settings
- Units with self-charging system and battery life up to 72 hours in online mode
- Multicarrier SIM for optimal mobile coverage

Solutions and Results

The NUTS solution provides:

- The capability to monitor impact during transportation or from handling on the company's premises
- Accurate current position of the container thanks to GPS
- Devices with hidden installation to protect the asset
- Immediate reaction in case of theft
- A dispatching system for drivers with route optimisation

These facts have been identified:

- Special modules with sensors provided valid data that accurately determined the current position of a container and its transport. In 100% of cases, the modules reported any movement and location change.
- Multicarrier IoT SIMs provided data in 100% of cases. The waste company could place a container anywhere and still have complete data.
- A dispatching system is much more effective than the drivers themselves; the average time savings was 49 minutes per day.
- Because the company has more than 5,000 containers in each country, operational costs are critical.
- In the case of a 5-year project, monthly costs must must not exceed €5 per 1 device (1 device = 1 container).

Summary

The special sensor modules provided valid data which helped improve internal processes, simplified external monitoring, and made the entire process more effective.

Thanks to the accurate GPS measuring of position and 100% data availability, the company has total control over their containers.

NUTS devices provide information for more than 3 years when installation is hidden, or for an unlimited time period when installed on top of the containers with the aid of a solar panel. The ability to provide all data via API and Webhook saved money for integration. The waste company uses only the necessary data.

Harley Davidson

/case study/

Harley Davidson's European HQ in Prague chose NUTS as the official IoT solution for their bikes as well as Harley Davidson (HD) events and shows to protect every HD asset.

Challenge

- To protect HD bikes which are for testing purposes – customers can borrow a bike for 1 day or a whole weekend.
- To ensure total control over the rental bikes – the bikes must be back at the specified time without any damage or overuse. To offer a smart IoT solution for HD customers to help them with bike protection (theft, crash, communication with friends, etc.)
- IoT device must fit with HD bikes without any modifications to the bike
- Devices for HD assets used in HD exhibitions (cars, show bikes, music equipment, boxes)
- Route optimisation and evaluation for HD challenges and events organised to promote the brand

Needs

- Simple and hidden installation at no additional cost
- Crash and bike fall detection to expose bad customer behaviour.
- Immediate information in case of theft (geofencing) and information when the customer does not manage to return the bike on time
- Online tracking of all used HD assets during an exhibitions
- Dispatcher view to manage up to 105 bikes during HD challenges

Requests

- Portable devices
- Remote configuration (OTA) of sensor settings
- Units with self-charging system and battery life up to 72 hours in online mode
- Multicarrier SIM for optimal mobile coverage
- Online overview for HD fans and the ability to share information to social media platforms
- Compatibility

Solutions and Results

The NUTS provides:

- The capability to monitor rental bikes for the whole rental period and to recognise any fall or bike crash

- Accurate current position of the bike and all HD assets thanks to GPS online mode

- Devices with hidden installation to protect the asset and without any bike modification. This device matching was approved by HD's Regional Director.

- Thanks to the NUTS dispatcher features, HD can provide HD Challenges and the winner can win up to 5,000 USD without any complaints from other participants.

- All rental bikes are ready for new customers on time. NUTS identifies users who are at risk of returning the bike late, and the HD representative can contact them in advance.

- Asset protection to a total value of 500,000 USD by NUTS during Harley Days, which hosts more than 35,000 visitors

These facts have been identified:

- Special modules with sensors provided valid data that accurately determined the current position of the bikes and their usage. In 100% of cases, the modules reported any movement and location change. 42% of customers do not watch the time and caused an issue with rental bikes NUTS helped to mitigate this negative aspect by 84% and increased the availability of rental bikes for new candidates/potential new customers.

- Device installation takes 80 seconds and removal takes 110 seconds without any bike damage and impact on the warranty.

- Fun factor is a key thing for end customers. The solution must provide information for their friends ("I am here, come to me,"/ to share their position on social networks and to enjoy the trip in 3D), so we implemented Google Earth to see the trip in a new dimension.

Summary

NUTS offers features for fun which is the most important thing for all bikers. NUTS can be used without any impact on the bike's warranty and improves internal HD processes in relation to new potential clients. The icing on the cake: NUTS helps with bike insurance by giving a 6% discount on theft insurance.

Hobby Markets

/case study/

The theft rate of trolleys reaches 37% of the total pool. In the worst cases, losses can be up to 110% per year. Stores have increased costs from purchasing new trolleys, and at the same time their customers are dissatisfied because there are no trolleys available.

Challenge

- Protect all shopping trolleys against theft
- A maximum send interval of 5 seconds
- Outlined area outside of which the trolley must not travel
- The system must allow for the division of roles into manager, facility manager, and security.
- The guard must receive information only in cases of theft.
- Solve GPS with an accuracy below 5m, including indoor use
- Unit life of at least 1.5 months on a single charge for 12h daily use
- Easy handling of the energy charging unit
- Hidden installation of the unit without damaging the trolley's surface
- Warning of tilting due to mishandling
- Water and frost resistance due to the location of the trolley in front of the shop
- Support of all mobile networks for the highest reliability of data transfer in case of theft and asset tracing
- Unlimited mobile data for 12 hours of daily operation, 7 days a week
- Maximum number of false position alerts due to faulty GPS based on GPS technical capabilities of 2 alerts per day to keep the security guard ready
- Automatic sleep mode when trolleys are stored

Needs

- Complex guarding of shopping trolleys
- A system that can self-evaluate theft and then pass on security information to secure property
- Monitoring the correct handling of trolleys
- Ensure trolleys are available for customers
- Reduce the cost of purchasing new trolleys
- The solution must correspond to specific locations in different premises.
- Each unit must have remote control to update the settings
- Low battery warning

Requests

- Portable unit without cables or buttons
- Robust unit that cannot be destroyed without using a hammer
- The unit must be firmly placed on the trolleys without breaking the trolley's surface
- Remote management and settings
- Unit battery life of at least 1.5 months at 12h of daily operation
- GPS accuracy up to 5m
- Immediate notification of trolley moving off site; notification of potential theft must arrive within 5 seconds.

Solutions and Results

NUTS provides:
- Reduction of trolley losses by 91% thanks to online monitoring 24 hours a day
- Automatic security alert for a trolley leaving the area
- Trolley tracing using the mobile app
- Setting of rules directly corresponding to the given facility (size and dimensions of the premises, setting of the forbidden zone)
- Automatic low battery alert with 7-day reserve
- Accuracy of units up to 4m and automatic notification within 5s of leaving the area
- Implementation of Edge computing for online event evaluation directly in the unit
- Using GPS satellite counting to eliminate erroneous GPS coordinates
- Special site configuration that ensures battery life of 8 to 10 weeks on a single charge
- Data availability 99.98% thanks to a special solution where all mobile networks are available at the given location
- Connection to mobile phone security and real time alerts using push notifications or SMS
- Setting user authority to Administrator = Administrator, User = Store facility administrator, and Security Manager = Property Abandonment Alert only
- Unit design that does not prevent the use of trolleys even during storage and is invisible to the user

These facts have been identified:

- Identification of trolley tilt from 30 degrees due to occasional approach of the trolley to the curb
- Set low-battery alert 7 days in advance to provide enough charging time vs trolley availability for customers
- The number of false alerts must be at the level of max 1.5 alerts for all units per 1 day in order for the security guard to respond correctly to the system data.
- The location of the units must correspond to the handling of the trolley to avoid damage, and at the same time the requirements for the location according to the type of trolley must be met.

Alarm type	Event type	Text	Guarding	Address	Alarm time	Approved
Alarm from unit	HW Alarm	Alarm Device 17 | ALARM OUT OF POLYGON	Leaving Baumaxu		22/09/2019 08:28:24	
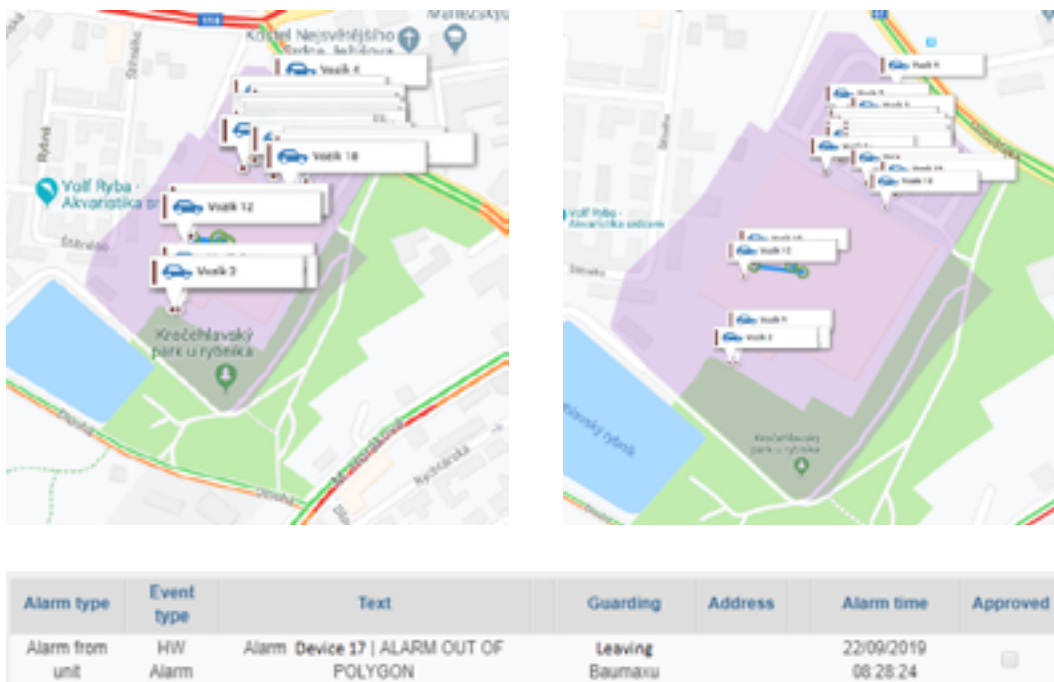
Summary

Thanks to the unique setup of trolley surveillance units, which is specifically designed for hobby markets, losses have been reduced by 91%. During two months of operation, the return on investment was more than 52%. Our solution is beyond the market standard because it is always a tailor-made solution that responds to customer needs, so that the entire solution can be deployed in under 3 hours, including unit installation and portal management with a mobile application.

Rental Companies

Every rental and leasing company monitors the wear and tear of its property (to ensure regular servicing, for the purposes of proper billing of customers, etc.). NUTS is a small portable device, which can be flexibly allocated to borrowed property, with maximum coverage and availability of data.

NUTS is also an excellent tool for checking servicing intervals and regular care for vehicles through record keeping, as well as preventing vehicle theft and mistreatment.

NUTS allows rental companies to record:

- How property has been treated, including data such as how many kilometres a vehicle has travelled and in what weather
- Whether the borrowed property has always been in a contractually agreed location
- The coordinates of the borrowed property (in case the rental company needs to retrieve the property or for theft prevention).

All such information can help companies save money.

What type of rental companies is NUTS suitable for?
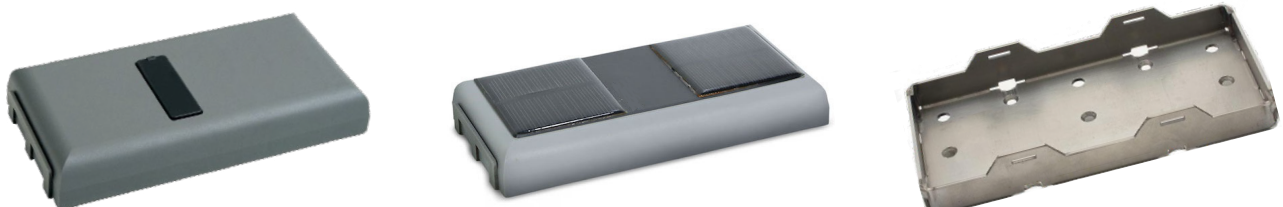
- Logistical equipment (semi-trailers, carts, towing vehicles, etc.)
- Construction machinery (dredgers, cranes, platforms, etc.)
- Farming equipment (tractors, ploughs, blades, etc.)
- Campers, cars
- Canoes, boats, and watercraft
- Motorcycles and scooters
- Railcars
- Traffic signs
- Waste containers
- Portable toilets
- Paddle boats at hotels and recreation centres

Technical Parameters of Units

NUTS L

GSM	QuadBand 2G – 3G	850/900/1800/1900 MHz – 850/900/1800/1900/2100 MHz	
	SIM	Micro Sim, Plug -in 1.8 V	
	Types of communication	Calling, SMS, GSM Data, GPRS	
	Calls	Alarm call	
	SMS	Alarm & Info SMS, SMS commands, requests, SMS configuration	
	GPRS internet connectivity	Class 12 / static & dynamic IP VPN, UDP protocol / 128bit security encryption key / FW upgrade, configuration settings, online **value reading, report memory reading, control**	
GNSS	GPS a Glonass	66 satellites	
ANTENNAS	GPS and GSM	Internal or external antennas	
BATTERIES	Type and capacity	LiIon 15 600 mAh rechargeable	SOLAR device with 15 600 mAh battery
		LiIon 21 600 mAh rechargeable	LiIon 13 000 mAh rechargeable
CONSUMPTION	Standby	0.2 mAh continuously	
	Sending of GPS position to server	0.6 mAh single shot	
	Self-discharge of battery	0.6 mAh continuously	0.02 mAh continuously
INPUTS	USB Micro	Charging * / report memory reading/ configuration/ FW upgrade ~ sealed optionally	
SENSORS	3 dimensions G sensor	Movement detection / tilt detection / vibration histogram / G-shock	
	Other sensors	Temperature, humidity, air pressure	
INTERNAL MEMORY	Flash 512 kB	Min. capacity 5000 events or positions	
DIMENSIONS	Plastic box	177 x 85 x 25 mm	
TEMPERATURE RANGE	LiIon rechargeable batteries	-25 °C up to +70 °C, charging 0 °C up to +70 °C	
	LiSoc non rechargeable batteries	-35 °C up to +85 °C	
PROTECTION CLASS	IP65	Waterproof	
WEIGHT	With batteries	550 g	
CERTIFICATIONS	CE	EMC	
	ATEX	ATEX EX II 3G Ex ic IIA T4 Gc	

* For models with rechargeable LiIon battery only

NUTS M

GSM	**QuadBand 2G – 3G**	**850 / 900 / 1800 / 1900 MHz – 850 / 900 / 1800 / 1900 / 2100 MHz**	
	SIM	**Micro Sim, Plug -in 1.8 V**	
	Types of communication	**Calling, SMS, GSM Data, GPRS**	
	Calls	**Alarm call**	
	SMS	**Alarm & Info SMS; SMS commands, requests, SMS configuration**	
	GPRS internet connectivity	**Class 12 / static & dynamic IP VPN, UDP protocol / 128bit security encryption key / FW upgrade, configuration settings,** online **value reading, report memory reading, control**	
GNSS	**GPS and Glonass**	**66 satellites**	
ANTENNAS	**GPS and GSM**	**Internal**	
BATTERIES	**Type and Capacity**	**LiIon 7 800 mAh rechargeable**	**LiIon 10 800 mAh**
CONSUMPTION	**Standby**	**0.2 mAh continuously**	
	Sending of GPS position to server	**0.6 mAh single shot**	
	Self-discharge of battery	**0.6 mAh continuously (temp. 15 °C – 25 °C)**	
INPUTS	**Charging by cable***	**Charging 8-35 V / max. 1 A@8 V**	
	USB micro **	**USB charger 2A -see accessories**	
	Analogue	Analogue value 0-30V	
	Binary*	**Binary value (log0 = 0-4 V, Log 1 = 5 – 30 V)**	
SENSORS	**3 dimensions G sensor**	**Movement detection / tilt detection / vibration histogram / G-shock**	
	Other sensors	**Temperature / humidity / air pressure**	
INTERNAL MEMORY	**Flash 512 kB**	**Min. capacity 5 000 events or GPS positions**	
DIMENSIONS	**Plastic box**	**120 x 80 x 24 mm**	
TEMPERATURE RANGE	**LiIon rechargeable batteries**	**-25 °C up to +70 °C, charging 0 °C up to +70 °C**	
PROTECTION CLASS	**IP65**	**Waterproof**	
WEIGHT	**With batteries**	**220 g**	
CERTIFICATION	**CE**	**EMC**	
	ATEX	**ATEX EX II 3G Ex ic IIA T 4 Gc**	

* For models with cable only, ** For models with USB charging

NUTS S

GSM	**QuadBand 2G – 3G**	**850/900/1800/1900 MHz – 850/900/1800/1900/2100 MHz**	
	SIM	**Micro Sim, Plug-in 1.8 V**	
	Types of communication	**Calling, SMS, GSM Data, GPRS**	
	Calls	**Alarm call**	
	SMS	**Alarm & Info SMS; SMS commands, requests, SMS configuration**	
	GPRS internet connectivity	**Class 12 / static & dynamic IP VPN, UDP protocol / 128bit security encryption key / FW upgrade, configuration settings,** online **value reading, report memory reading**	
GNSS	**GPS and Glonass ****	**66 satellites**	
ANTENNAS	**GPS **, GSM**	**Internal**	
BATTERIES*	**Type and Capacity**	**LiIon 1 500 mAh rechargeable**	**LiIon 3 000 mAh**
CONSUMPTION	**Standby**	**7 mAh a day**	
	Sending of GPS position to server **	**0.6 mAh single shot**	
INPUTS	**Charging by cable***	**Charging 8-35 V / max. 0.5 A@8 V**	
	USB micro-internal	**Charging* / report memory reading / configuration / FW upgrade**	
	Analogue	Analogue value 0-30V	
	Binary*	**Binary value (log0 = 0-4V, Log1 = 5–30V)**	
SENSORS	**3 dimensions G sensor**	**Movement detection / tilt detection / G-shock detection**	
	Other sensors	**Temperature**	
INTERNAL MEMORY	**Flash 512 kB**	**Min. capacity 5 000 events or GPS positions**	
DIMENSIONS	**Plastic box**	**50 x 90 x 20 mm**	
TEMPERATURE RANGE	**LiIon rechargeable batteries**	**-20 °C up to +60 °C, charging 0 °C up to +60 °C**	
	Without battery	**-25 °C up to +80 °C**	
PROTECTION CLASS	**IP65 / IP68**	**Waterproof / Watertight**	
WEIGHT	**With batteries**	**50 g**	
CERTIFICATION	**CE**	**EMC**	
	ATEX	**ATEX EX II 3G Ex ic IIA T 4 Gc**	

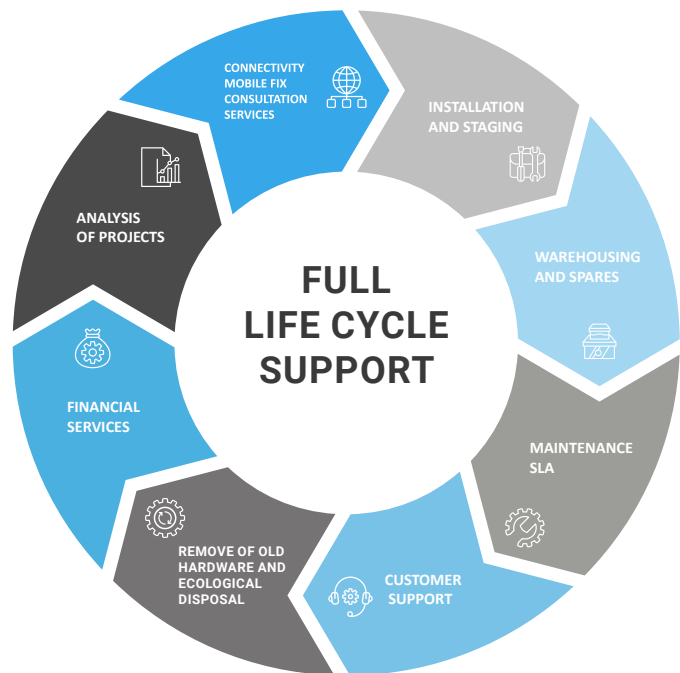* For models with cable only, ** Not valid for GC 077 202

About developer of NUTS

Neeco is a leading provider of complex, global ICT services with operations in more than 160 World Countries.

"We help our clients, typically large organisations operating over multiple countries, to focus on their primary areas of interest and get the best business outcomes, through consultancy services, innovations of their digital solutions and agile procurement outsourcing."

As a single point of contact for diverse requirements, Neeco is a trusted partner who provides industry-recognised experience and consistent, high-quality services regardless of the solution, place, or time of service deployment.

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- INSTALLATION AND STAGING
- WAREHOUSING AND SPARES
- MAINTENANCE SLA
- CUSTOMER SUPPORT
- REMOVE OF OLD HARDWARE AND ECOLOGICAL DISPOSAL
- FINANCIAL SERVICES
- ANALYSIS OF PROJECTS

2009
Founded

Grow rate
30% per annum

1900+
NGA partners

Operations 160+
countries worldwide

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Let's get in touch

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