

# Hi-Tech Technology Company



RFID Digital Mass Measurement  
Network of Rail Sensors, Loading Test  
Industrial Measurement Technical  
Development

2015 UGANDA

# httc

# RFID and Mass Measurement

## The Software and the Main Units of the System

software



This is a clear-cut system consisted of web based client-side **applications**. Imports of basic data can be solved from external systems.

rfid chip



The **RFID (Radio Frequency Identification)** can be used for the identification of moving objects and for an automatic transfer of data having been identified. An object can be a commodity, some machine components, but even just a person. Nowadays, through the technology it has become possible for the system, to perform any automatic commands even in a mode where any need of human resources is eliminated.

There are included different components in the system, as a **chip** provided with an antenna, which has been installed onto the product (transponder = a member, all the three names can be used). In the chip the individual data are included through which a given product can be distinguished from the other ones.

RFID Reader-and  
Controller Unit



Through a reader by means of which the **data of chip is read off** any information stored by the chip will be read off according to a pre-programmed methodology. A radio frequency emitted by itself and reflected through the transponder is used for the identification and for transferring of data from the central servers. On the basis of information transferred for it any assigned equipment will be instructed to perform the commands.

RFID Industrial  
Manual Reader

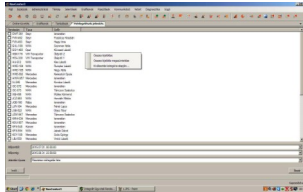


From the part of the **control unit**, radio waves of frequency 866 MHz (UHF-range) will be emitted through the antennae attached to it. The radio waves have a double role. From one part, the RFID (member) will be provided with energy, and from the other part a channel of information is provided between the reading and the passive matrices. The tools are able to perform a very quick form of communication on a relative big distance (5 to 10 m typically) (400 reading per sec) in a two-directional (writing/ reading) mode. A control unit which is able to work in an independent (programmed) mode too, in addition with the control of maximum 4 antennae, has a programmable range of attachment uniting 4 inlet and 8 outlet points. Any programmes of application, by which an interactive or a hybrid mode of operation is applied, are connected with the control unit through an integrated connection of communication network (LAN) of 100 MB.

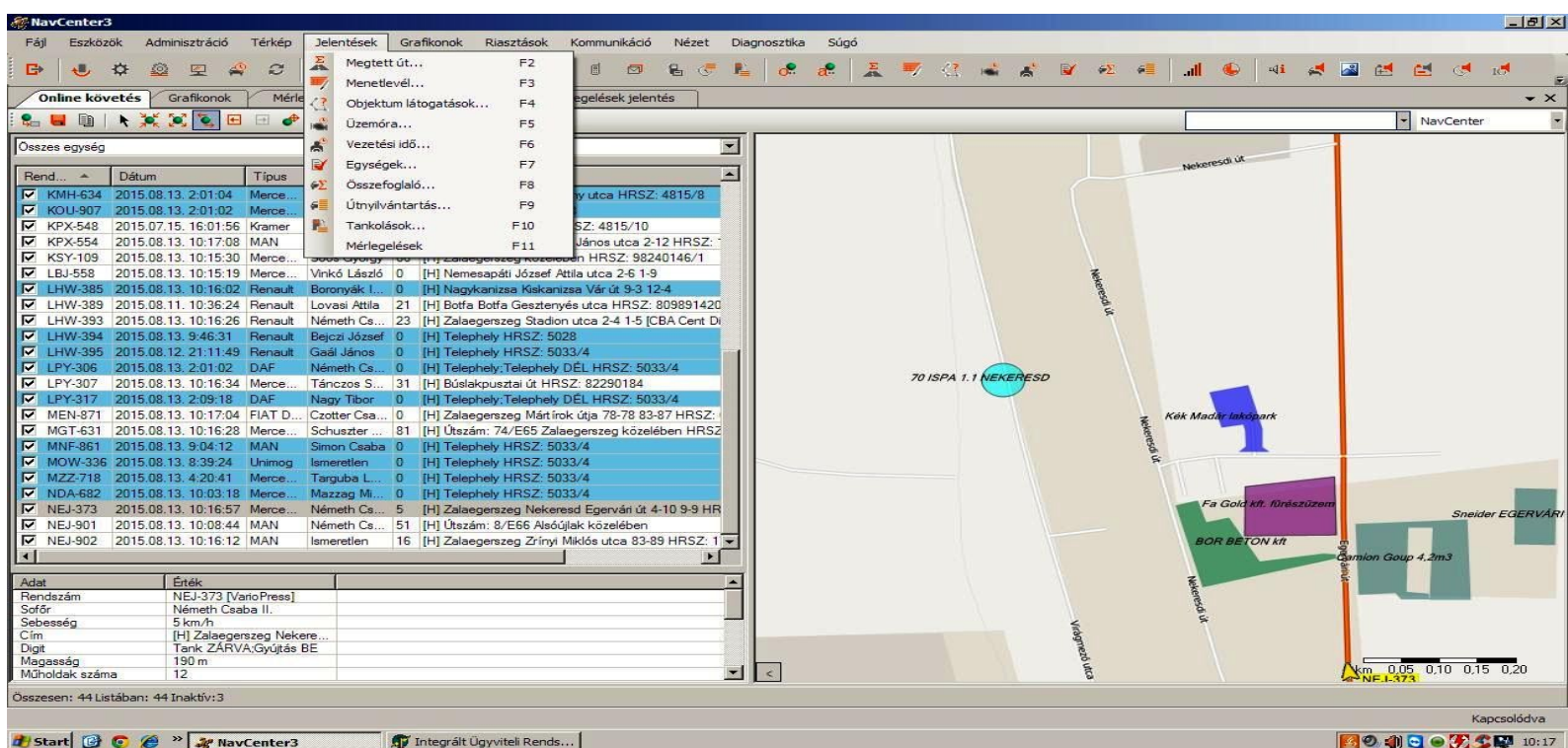
By the device of Motorola a new standard has been established in the category of industrial and **manual RFID-readers**. By the reader having a stronger sensitivity a higher speed and a larger distance of reading is provided, so the tasks can be performed more frequently and more precisely.

# RFID and Mass Measurement

## The Software and the Main Units of the System

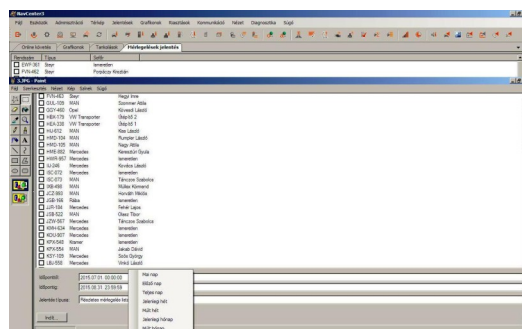


This is a clear-cut system which is consisted of web-based, client-side **applications** (it can be reached for the citizens too). The wide-range possibilities of questioning - arrangement, selection - can be varied in a flexible manner, according to aspect which can be adjusted by the user. The logging, reporting and retrievability of activities of users and administrators, etc., can be a part of the repertoire too. It will be recommended from our part together with a tracking and travel optimization of vehicles.



The screenshot displays the NavCenter3 software interface. On the left, there is a list of vehicles with columns for 'Rend.' (Vehicle ID), 'Dátum' (Date), and 'Típus' (Type). The list includes vehicles like KMH-634, KOU-907, KPX-543, KPY-554, KSY-109, LBU-558, LHW-385, LHW-389, LHW-393, LHW-394, LHW-395, LPY-306, LPY-307, LPY-317, MEN-871, MGT-631, MNF-861, MOW-336, MZZ-718, NDA-682, NEJ-373, NEJ-901, and NEJ-902. Below the list, there is a table with columns 'Adat' (Data) and 'Érték' (Value), showing details for vehicle NEJ-373, such as 'Rendszám' (Vehicle ID), 'Sofőr' (Driver), 'Sebesség' (Speed), 'Cím' (Address), 'Digit' (Digit), 'Magasság' (Height), and 'Műholdak száma' (Number of satellites).

On the right, there is a map showing the location of the vehicles. The map includes labels for 'Nekeresd út', 'Kék Madár lakópark', 'Fa Gold kft. kőszármű', 'BOR BETON KFT', 'Sneider EGERVÁRI', and 'Camion Goup 4.2m3'. A scale bar at the bottom right indicates distances from 0.05 to 0.20 km.





## Measurement on a Superstructure and on a Discharging Structure

The material contained by the tank of the vehicle (for example plateau, fluid, powder and solid material, superstructure for the disposal of the waste, or elevator of pallet) will be measured, through this the mass of the commodity loaded up and/ or dosed can be determined.

The measurement device is operated electrically; any system of elevation is not contained. The receiver of the load is part of the so called "critical receivers of load", if it had been installed onto a mobile vehicle.

The receiver of load is located on the seat plates of 4 or 6 pcs of twin weighing cell of shorn system, which is not sensitive for impacts so no locking will be needed.

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The measurement device has been integrated to the discharge **unit** of the vehicle by which the disposal of the waste is performed. In the course of the tilting of the vessels the quantity of waste discharged from the waste container will be measured automatically and it will also be measured when the discharged container is lowered.

The quantity of the waste is the difference of both measurement results. The procedure of discharge will not be influenced by the measurement. The identifier of the waste container placed up will be recognized by the measuring device.

The identifier, the result of measurement as well as the time of the measurement will be stored without any intervention; no supplementary changes will be made possible.

The measurement device will operated properly on a natural field (in the case of a longitudinal and a cross-wise canting).

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It can be provided by both systems, that the measurement data could reach the system of informatics located in the centre of user, in an applicable format of data and **in a real time**. The sending of data is performed through the GPS-system of the vehicle tracking GPS-system located on its deck. To this a system, for optimizing the travel of vehicles, a vehicle tracking and an open-air informatics can be attached too.



## Measurements on a Superstructure and on a Discharging System



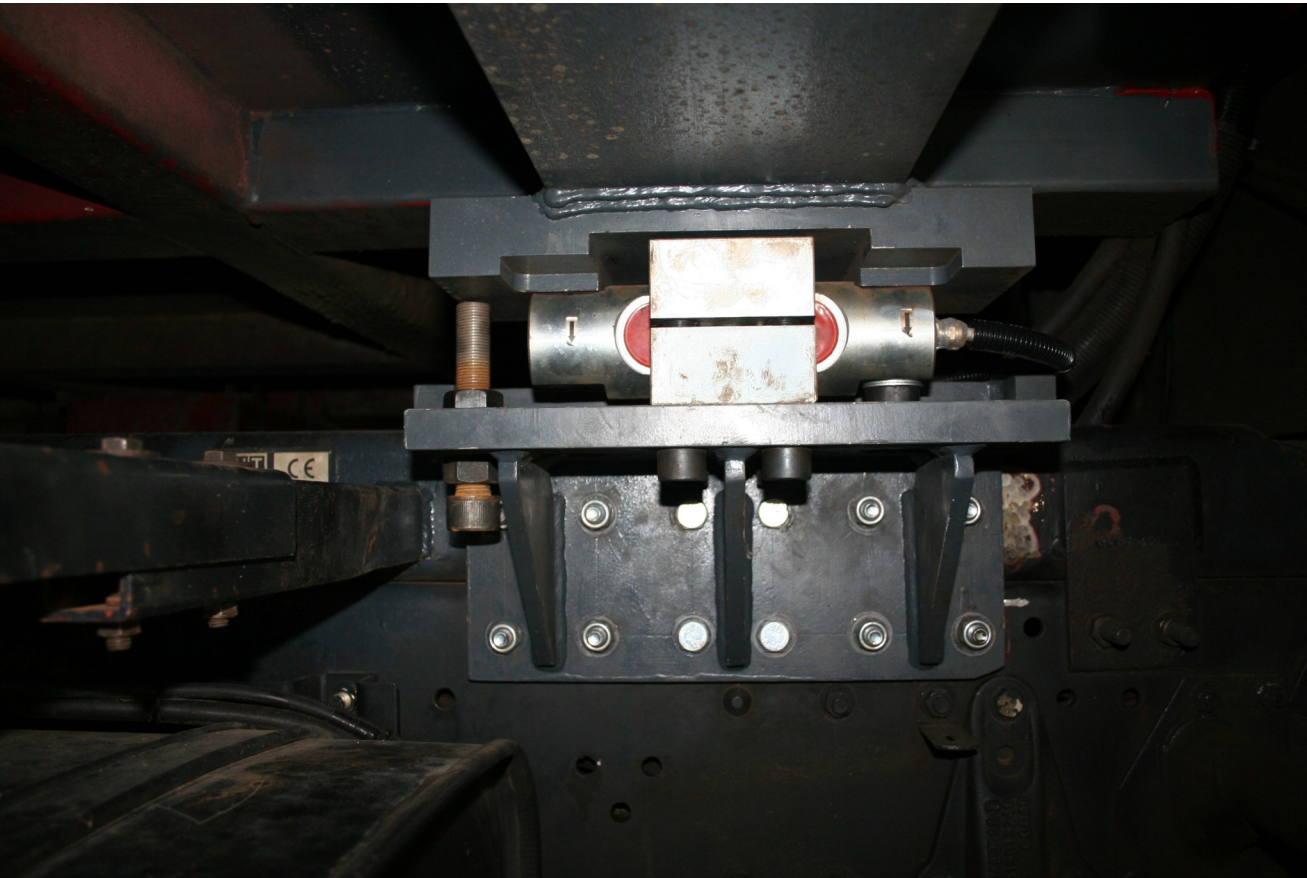
Under-secretary of state V. Németh Zolt, htc Antal Buris and executive György Schanda Tenzl

In the driver's cabin is located an equipment for the evaluation. If needed, a **data collector** and a **printer** can also be attached as a **periphery**.

A printer, by which the value of the actual mass, the starting and the finishing stock if needed, as well as the received/given value of mass will be printed.

The structure by which the load is received is located on the seat plates of 4 or 6 pcs of twin **scale-cells** of shore system. On this has been welded the leg of the vessel or that of the plateau and the weighing cell **force introducer** (stocks or stirrup) is supported by means of a screw bond to the supporting brackets welded onto the frame.

Through the force introducers a small self-adjustment and fixation of the weighing cells is made possible





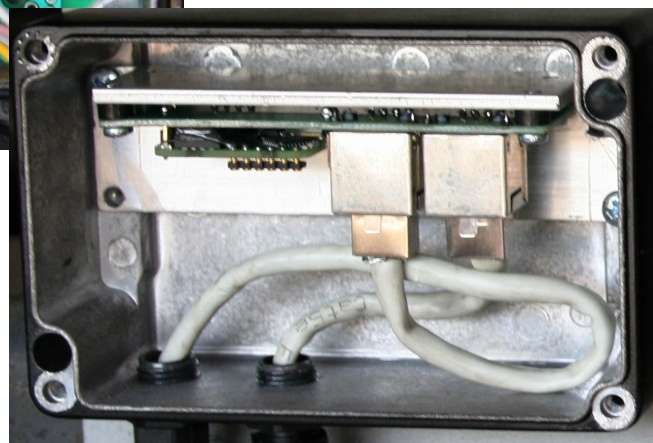
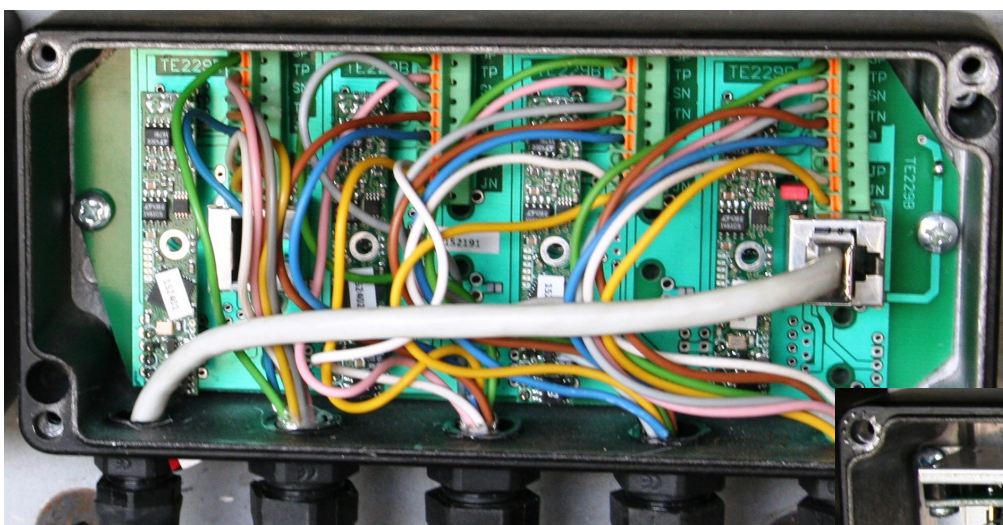
# RFID and Mass Measurement

## Measurement on a Superstructure and on a Discharging System



Any signal cables of the **weighing cells** will go to the **strapped box** along a frame, led through a flexible goose neck. The stripped cable, together with the cable of **inclinator & compensator** electronics fixed to the frame, will be connected into the evaluation unit of the scales placed in the driver's cabin.

By the part of an antijam supply unit, the evaluation instrument, the weighing cells, the inclinor, the collector of measurement data and the printer will be provided with smooth feed voltage from the source (24 V DC ) of the power supply of the car.





## Measurement on a Superstructure and on a Discharging System

Some digital weighing cells are connected to the **display unit**. After an amplification and digitalization, the signal of the bonded scale gauge will be processed by a microprocessor, and will be compensated on the basis of the outlet signal of the inclinometer. The results of measurement will appear on the display.

In the case of a closure of the evaluation unit by means of a software, the function of adjustment of the evaluation unit can be accessed freely; however the value of the code of calibration will grow by one (with a denomination „event counter" according to Welmec-recommendation)

The counter can not be shifted backwards and can not be set to zero. When switching-in, the value of the calibration code will appear for a short time after the display test. This can be compared with the value which was indicated on the data table during the EC-calibration or the manufacturer's attestation.

When both numbers are not the same, then the lead seal shall be considered as broken.



Evaluation Display



## Technical and Metrological Data

For **waste containers** corresponding with all standards (**on a discharge structure**):

upper limit of measurement: max. 200 kg

lower limit of measurement: min. 2.5 kg

value of division for the calibration:  $e = 0.5 \text{ kg}$

built-in weighing cells: *digital weighing cell*, controlled through CAN-bus

classification of the measurement device: *automatic scales* (MID MI-006)

environmental classification, mechanical: installed onto vehicle, MID M3

environmental classification, electro-magnetically: MID E3

for **containers** corresponding with all kinds of standards:

upper limit of measurement: max. 2000 kg

lower limit of measurement: min. 25 kg

value of division for calibration  $e = 5 \text{ kg}$

Built-in weighing units: *digital weighing unit*, controlled on a CAN-bus

classification of the measurement device: *automatic scales* (MID MI-006)

environmental classification, mechanical: installed onto vehicle, MID M3

environmental classification, electromagnetically: MID E3

The **weight measurement** of the load of the vehicle (**measurement of the superstructure**) by means of digital weighing cells

Upper measurement limit: max. 100 kg...30 tons - (1000 tons)

Lower measurement limit: min 20'000

Division mark of the calibration:  $d \geq 100g$   $e = d$

Class of accuracy: Capability of calibration III and Class of Weight Measurement IIII  $n \leq 2000e$ ,  $2 \times 1000e$ ,  $1000e$

Upper temperature limit:  $+55 \text{ C}$ ; lower temperature limit:  $-25 \text{ C}$

Built-in weighing cells: *digital weighing cell* CAN controlled on a CAN-bus

Compensation of angular offset: measurement for angular offsets by means of electronics

Supply voltage: 24V DC, from a car battery

The area of application of measurement devices: application in the open area, by means of a protection IP67

Some daily reports, and statements can be made in a way, the in the case of an interruption of the electric power the tare weight will not be lost. The storage of recorded measurement data on an ordinary pen-drive will be made possible by means of an USB- interface.



# Traffic sector

## Diagnostics on a Travelling Speed

### Investigation of Causes



Disimprovement of the railway tracks can be considered as a natural physical procedure which can not be stopped and can not be reversed. For a disimprovement are needed a starting error and different harmful effects. Even by means of a maintenance performed in time these can be only controlled

The safety of the traffic of vehicles will be improved.

About 40 pc of the damages of the road covers are caused by heavy trucks and trucks with an overweight, endangering the safety of the participants. can be ural physical procedure.ics.le can be tthe truck driver.

(The rate of amortisation caused by a 40-ton-truck, participating in the traffic according to the regular principles, is the same than that of the rate of road damages caused by 300'000 pcs of passenger car. i

Through restoration of the caused damages can be required a significant expenditure of several billions of HUF each year. According to professional estimations one of one thousand violators was detected by the mobile measurement stations which already have been built or were placed occasionally on sites of measurement along the roads.

## Diagnostics in the Maintenance of Permanent Railway

### Causes by which the digitalized dynamic measurement of wheel load are arisen

The harmful effect are caused chiefly by the traffic, however the environmental effects (.e.g. weather - high/salty humidity, heat effect, chemical effect) shall be considered too.

#### Diagnostic functions:

Diagnostizing, registering and filtering the traffic of dangerous vehicles.

*The safety of the traffic is increased.*

.Any costs for the recovery of damages arisen due to the technical condition and the maintenance costs of the network of railway tracks are reduced significantly. Examination of geometrical causes, information, delivery of data Detection and observation of wheel errors: a diagnosis of the condition will be made for each wheels, which is sounded on the combination of the peak force and the dynamic force - its effective value under an other name. Any types of errors can be detected by the software precisely and safely. Asymmetry of loading: 1. loading of the front and the rear bogie, 2. between the pairs in the opposite directions 3. load on the right and on the left side is very high, 4. the most light wheel is maximally high - in relation with the average conditions. Identification of the overload, data delivery of data at the operator: *real conditions*

#### Further advantages of the networks of sensors:

The sensors are installed onto the rail-web, a low maintenance cost will arise. The measurement digitalisation and processing of the rail deformation occurs in modules mounted onto the rails. The high capacity processors are working directly on the rail, any data will be processed with a high speed of calculation. The accuracy of the measurement will not depend on the speed of the armature; Vmax: 130 km/h, accuracy: 2%. The installation is performed without a rail stop-piece.

#### Parameters measured by rail sensors and digital sensor networks:

thermal and mechanical interferences Examination of the rail track, fix settlement (section of geometric destruction) geometrical deformation - dimensional deviations, errors of dimensions (section of structural damage). Loading test, complete: measurement of the axle-load, measurement of the axle-weight, measurement of the total mass.

speed test , dynamic forecast of the rail temperature , bogie damages, detection , examination of critical rail/armature objects, etc. ... *with radio-link systems*

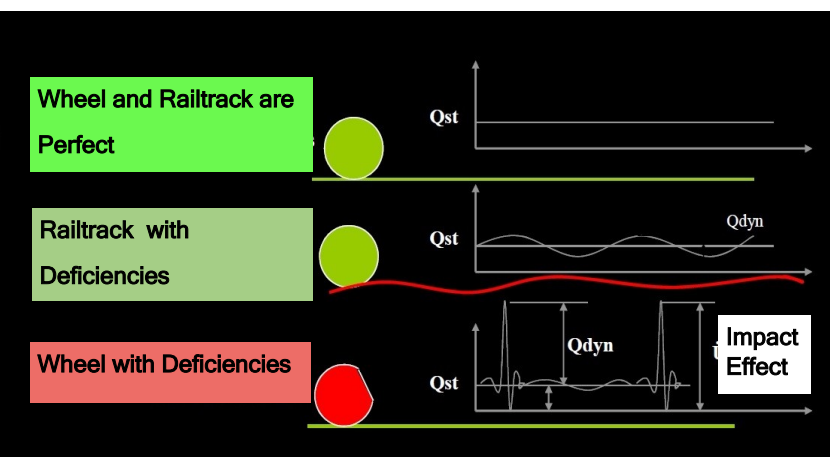
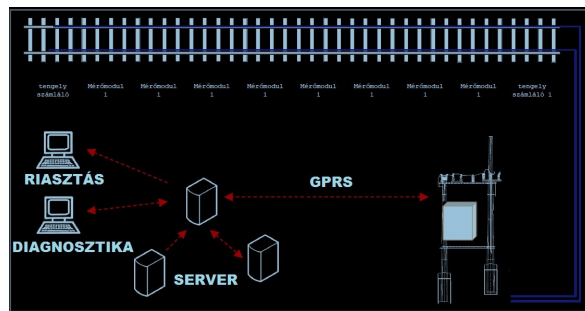
#### Signal processing modul:

Due to the change of the measuring current and that of the rail temperature the sensors are compensated. Beside the weight of the vehicle the algorithm of calibration is based on the speed of the vehicle too. The speed is relatively the same; it can not be accelerated, or braked. Establishing the necessary points of measurement, the average values will be given by the evaluation software, a result will be given which is located within the unsafe section of the measurement. Diagnostics: if among the wheels an impulse ( effect of impact) is given, it will not be registered as an error of deformation. In the operational use, the accuracy of the result will depend on the number of sensors and on the quality of the rails.



## Diagnostics in the Maintenance of Permanent Railway

Diagram



Diagnostics of vehicles

Welded Sensors



Signal Processing Module

# Investigation of Causes Load Test

## Built into the Road, Fix Settlement

The **pre-filtering** equipment was built into the street, but no special weighing unit can be sensed for truck drivers. The purpose of the application is the guaranteeing of the precision of procedure.

**A vehicle with an overweight which was determined by the pre-filter, has really an overweight with a probability of 95 pc.**

The substance of its function is, that by means of the piezoelectronic sensors built into the road cover, the actual values of axle-loading of a vehicle can be determined en route independently from the speed of the vehicle,

By means of a camera built in the asphalt and controlled by sensors, used for the reading of car registration plates, which is mounted to a roadside post, also the registration number of monitored vehicles - of any naturalisation - will be detected. Any axle-loads of the identified vehicle will be evaluated by measurement electronics.



The registry number of the vehicle which has been judged as having an overweight and another important data, site coordinates among others point of time, axle values measured during the travel, will be transmitted through radio communication channels to the nearest measurement station being prepared for taking an authentic measurement. After performing an authentic measurement against the drivers of vehicles with an overweight an action can be taken.



## Measuring Station – Measurement Wheel Load, Checking



## Investigation of Causes Load Test

## Measuring Station – Measurement Wheel Load, Checking

[illegible]

## Digital Measurement of Wheel-axle Weight



### Authentic, Measured Result

### Data Table



# Investigation of Causes Load Test

## Measuring Station – Measurement Wheel Load, Checking



Luxury Busses



Vehicle Weighing Car



Utility Trucks



Trucks



Digital Wheel Weighing Unit



Smaller Aeroplanes



Reference:

MUT Stokerau AUT

Magyar Közút HUN

M5 Lajosmizse mérlegállomás HUN

MUT Hungária HUN

Inphora Inc. USA

Micred Ltd. USA

Zala-Depó Hulladékgazdálkodási Társulás HUN

Zalaispa Hulladékhazdálkodási Társulás HUN

Homokhátsági Hulladékgazdálkodási Társulás HUN

Chinoín HUN

Dél-Alföldi Hulladékgazdálkodási Társulás HUN

Mikroszervíz Sp HUN

Magyar Állami Vasút HUN

EVOPRO (Dynamic Railway Diagnosis System)

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