APPLICATION HANDBOOK 2018

5 YEARS WARRANTY*

NIVELCO

*Valid from 2018.

5 years warranty from 2018

HUNGARIAN
PARALYMPIC
COMMITTEE

NIVELCO – official sponsor
of the Hungarian Paralympic Team

10 INDUSTRY SECTORS

30 COUNTRIES AROUND THE WORLD

250 REFERENCES

Who we Are?

What are we Manufacturing?

How we can Measure?

Where we are Measuring?

INNOVATION SINCE 1939

After training as an engineer in the ITT Standard telephone company, in 1939 Endre Szőllős started his own business designing and producing telephone systems for business and industry. While the World War II did not provide an easy period for Endre and his colleagues, the business grew and provided good training for his sons. Following their University courses in electrical engineering and economics respectively, Tamás and András Szőllős were able to lead the company forward, after the early death of Endre in 1969. By 1982, the production of a series of industrial controllers had led to a developing specialisation in level measurement and control: and **NIVELCO** was founded. In 1989, when International trade from Hungary became straightforward, **NIVELCO** had a full, proven level control product range and capability, backed by well established in-house manufacturing and engineering facilities. In 1989 the **NIVELCO** launch of the World's first Compact ultrasonic level transmitter had a major impact, offering a combined sensor / transmitter in one unit, leading the world market.

NIVELCO took the opportunity offered by these newly available export markets, and opened trading relationships with various identified distributors and sales agents. Building on existing sales links into neighbouring countries, **NIVELCO** also invested in their own sales organisations and offices in Austria and Poland, and then later in the Czech Republic, Romania, Russia, India, the USA, and Croatia. Our success in these ventures demonstrates that by maintaining our business principles, expertise and specialist skills, **NIVELCO** can compete successfully with the best suppliers to the industry, by providing:

- Wide range of products to suit all applications
- Investment in advanced technology expertise and high quality product development
- High specification quality management and control systems
- Worldwide marketing, sales and service support
- Fast, flexible in-house production and customer order logistics
- Company-wide IT System to provide full product design and production data
- Fair, modest pricing, ensuring the capital for future customer support and development
- Continuing investment in our people and their working relationships

Despite that in today's globalised world, the multinational giants – set up for mass production – can rule the market, there are many medium-size companies who specialise in satisfying customer needs, and manufacture products with high intellectual added value.

The achievements of **NIVELCO** demonstrate that flexible, customer-led medium-size companies can find their place in the market and maintain their independence.

NIVELCO PROCESS CONTROL CO.
BUDAPEST, HUNGARY

- **NIVELCO Messtechnik GmbH** Wien, Austria – 1991
- **NIVELCO-Poland Sp. z.o.o.** Gliwice, Poland – 1995
- **NIVELCO Bohemia s.r.o** Brno-venkov, Czech Republic – 2004
- **OOO NIVELCO-Rus** Moscow, Russia – 2005
- **SC NIVELCO Tehnica Masurarii SRL.** Sângeorgiu de Mures, Romania – 2005
- **NIVELCO Instruments India Pvt. Ltd.** Pune, India – 2007
- **NIVELCO USA LLC** Naperville, USA – 2008
- **NIVELCO Mjerna Tehnika d.o.o.** Rijeka, Croatia – 2012

NIVELCO'S POSITION IN THE WORLD

Doing some business with East Bloc countries was what we had as export in the 80's, when **NIVELCO** was formed: the East Bloc was still its old self and markets were closed. Nevertheless **NIVELCO** was an export driven company, and almost a decade later, in 1990, we were able to show our muscles to the world for the first time. This was the beginning of **NIVELCO**'s export success. Almost thirty years later, exporting more than 80% of its production, **NIVELCO** has now proved itself to be an export oriented company. Covering over 75 countries through our own subsidiary companies and through distributors, our products reach almost all world markets. To aid distributors and our own subsidiaries, regular training programmes are organised in order for their staff to keep up with technology driving **NIVELCO**'s high tech instruments. Sales meetings held annually provide a vehicle for information transfer and for an exchange of ideas between people from all over the world. When our dealers participate in international exhibitions, they are supported with operational models, exhibition accessories and experts. With the success seen with the **NIVELCO** non-European subsidiaries (like USA, Russia and India), there is the strong intention to open further similar subsidiaries in the near future.

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APPLICATION HANDBOOK

INTRODUCTION

NIVELCO Process Control Co. celebrated its 35th anniversary in 2017. Founded in 1982 to concentrate on the manufacture of industrial level measurement and control products, **NIVELCO** is now a world-class level specialist, based in *Hungary*. The **NIVELCO** strength originates from the solid base created by a family business, guided almost 80 turbulent years by four basic principles:

- Respect for the Knowledge and Experience of the Founders
- Professional Pride in our Products
- Responsibility for our Colleagues and Customers
- Ensuring our Products and Services provide Value

NIVELCO has established and maintained a leading and respected world market position, and in the past 35 years has sold almost 1 million units of level instrumentation: **NIVELCO** is now the 4th largest ultrasonic level transmitter producer in the world.
Through its subsidiaries and distributors, **NIVELCO** is represented on the markets of many countries of the world. We are proud that in a number of industrial segments our devices are used with satisfaction. Our company is committed to establishing long-term, trusted and satisfied business and partner relationships.
We know that besides the excellent value for money, there are other key factors to our clients such as quality, guarantee and business reliability. This can only be provided through quick performance, quality products and services.
In 2010 we introduced our 3 years full warranty for our products instead of the previous 2 years. Thanks to the conscious quality policy represented by **NIVELCO**, our quality indicators have shown excellent results and positive changes since then.
We are therefore pleased to announce that starting from 2018, instead of 3 years, uniquely in the industry we provide 5 years of warranty for every single **NIVELCO** instrument! We are confident that our decision will further strengthen the confidence in our company and our products.

Our Application Handbook represents our three and a half decades of experience in professional level measurement. The aim of this Handbook is to share our experiences we have obtained in various segments of the process control industries by means of application references.

Tamás Szóllős
CEO

DISTRIBUTION NETWORK

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Australia, New Zealand

SUBSIDIARY COMPANIES NETWORK

SUBSIDIARIES

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Russia	ООО НИВЕЛКО-Рус	russia@nivelco.com
USA	NIVELCO USA LLC	usa@nivelco.com

COMPANY & PRODUCT CHRONOLOGY

1982 – 1991

1982 **NIVELCO** formed
1982 NIVOSONAR,
the first Ultrasonic level transmitter
1984 NIVOCONT Vibrating rod level switch
1986 NIVOCAP Capacitance level transmitter
1989 NIVOSONAR Compact
Ultrasonic level transmitter: A WORLD FIRST!
1991 NIVELCO Messtechnik (Austria)

1992 – 2002

1992 New factory opened in Budapest
1994 NIVOPOINT Float level switch
1994 NIVOMAG Magnetic coupling level switch
1995 Accreditation to ISO 9001
NIVELCO Company in Poland
1996 NIVELCO Trade Center
1996 NIVOSWITCH Vibrating fork level switch
1999 NIVOPRESS Hydrostatic level transmitter
2000 Budapest Factory expansion
2001 NIVOTRACK Magnetostrictive level transmitter
2002 Standardized mechanical and electronic construction
HART Digital Communication in the transmitters

2003 – 2017

2003 ATEX Hazardous Area Approvals
2004 MultiCONT the new system concept
NIVELCO Bohemia (Czech Republic)
2005 MicroTREK Radar-based level transmitter
NIVELCO T.M. Company in Romania
2007 NIVELCO Instruments (India)
2007 NIVELCO Company in Russia
2008 NIVELCO Company in USA
2009 AnaCONT – pH, ORP and conductivity transmitter
the first SIL product certification
2010 AnaCONT Dissolved oxygen transmitter
2012 PiloTREK Non-contact radar level transmitter
NIVELCO Company in Croatia
2013 NIVOCAP CK RF-capacitance level switch
2016 The first FM approval
2017 EasyTREK SP-500

LEVEL TRANSMITTERS

Since its foundation **NIVELCO** has focused on the manufacture of industrial level measurement products. Our focus has not changed, demonstrated by our wide level transmitter portfolio employing many different types of level measurement methods. Our ultrasonic level transmitter selection is definitely the widest on the market offering integrated, compact, 2- or 4-wire transmitters for liquids or solids with remarkable number of optional choices. Most of our transmitters are available with PFA coated probe for aggressive mediums, and all transmitter families have explosion-proof models applicable in hazardous environments. Moreover we offer devices with explosion proof dual compartment aluminium housing for FM & CSA approved requirements.

PiloTREK — Non-contact radar

- 25 GHz (K-band) measuring signal
- 2-wire compact transmitter
- Accuracy up to ±3 mm (0.12 inch)
- Measuring range up to 23 m (75 ft)
- Max. 25 bar (363 psi g) and 180 °C (356 °F)
- 4 – 20 mA + HART® communication
- $\varepsilon_r > 1.9$
- IP67 protection
- Explosion-proof models
- FM & CSA approved

The K-band **PiloTREK** Pulse Radars are regarded among the most progressive non-contact level transmitters of the industrial process automation field. Their accuracies are excellent and their short and narrow antennas make their installation simple and low cost. **NIVELCO**'s K-band radar featuring ±3 mm (0.12 inch) accuracy and short dead band excels with its versatile housing concept lining up plastic, aluminium and stainless steel versions. Its antenna range incorporates stainless steel horn or parabolic antenna and enclosed plastic tube varieties. The enclosed antenna versions can be replaced without removing the antenna enclosure from the process. Local programming of the **PiloTREK** is aided by an optional plug-in display module. The signal processing algorithm of the **PiloTREK** making it an excellent choice for applications simple and challenging alike.

MicroTREK — Guided wave radar

- 2-wire compact transmitter
- TDR principle
- ±5 or 20 mm (0.2 or 0.75 inch) accuracy
- $\varepsilon_r > 1.4$
- Measuring range up to 24 m (80 feet)
- 4 – 20 mA + HART® communication
- Max. 40 bar (580 psi g) and +200 °C
- Rod or cable probes
- Plug-in graphic display module
- Explosion-proof models

The **MicroTREK** guided wave radar level transmitter is designed for continuous level measuring of conductive or non conductive liquids, pulps and solids. **MicroTREK** level gauge operates based on the TDR (Time Domain Reflectometry) principle. Micropulses are sent along a probe guide at the speed of light. As soon as the pulse reaches the surface of the medium, it is reflected back to the electronic module. Level distance is directly proportional to the flight time of the pulse. The reflected signal is dependent on the dielectric constant of the material, the feasibility of the measurement is $\varepsilon_r > 1.4$. The TDR technology is unaffected by the properties of the medium or the space above it. Measurement is also unaffected by the change in the physical properties of the materials such as temperature, pressure, dielectric constant.

EchoTREK for liquids — Ultrasonic compact

- 2- and 4- wire compact transmitter
- Narrow 5° beam angle
- Max. 25 m (82 ft) measurement range
- PP, PVDF, PTFE and ss transducers
- 32-point linearization
- 4 – 20 mA + HART® communication
- Explosion-proof models, IP67

The **EchoTREK** is an intelligent compact ultrasonic level transmitter installed on the tank roof, or above the liquid surface. The transmitters give 4 – 20 mA analogue output or transmit HART® digital data. Local reading is ensured by an optional plug-in display and four keys provide for programming. The level transmitters can be used in multi-drop systems connected to **NIVELCO**'s **MultiCONT** process controller, or to a PC with the help of the **UNICOMM** HART® USB/RS485 modem. **EchoTREK** are available with measurement ranges up to 25 m providing wide application possibilities. The ultrasonic level transmitters are using **NIVELCO**'s established SenSonic range transducers with a full beam angle of 5 to 7 degrees connected to the intelligent electronics featuring the QUEST+ advanced signal processing algorithm.

LEVEL TRANSMITTERS

EasyTREK for liquids — Ultrasonic integrated

- For liquid level measurement
- 2-wire integrated transmitter
- Narrow 5° beam angle
- Max. 25 m (82 ft) measurement range
- 4 – 20 mA + HART® communication
- Open channel flow metering
- Explosion-proof models, IP68
- Can be powered from 12 V battery
- Handheld compatibility

The **EasyTREK** is a rugged, high performance ultrasonic level measurement transmitter, having transducer and processing electronics incorporated in a single housing. Whether for liquid level measurement in sumps or tanks, for tank contents measurement, or open channel flow measurement, **EasyTREK** transmitters provide the answer. The **EasyTREK** is an integrated, blind transmitter with equal measuring performance as the **EchoTREK** but readable and programmable remotely only through HART® protocol.
The new **EasyTREK SP-500** series transmitters can be remotely programmed also with Handheld Field Communicator, and can be connected wirelessly to a PC with the **SAT-504** Bluetooth® HART® modem.

EchoTREK for solids — Ultrasonic compact

- For free flowing solid measurement
- 4-wire compact transmitter
- Narrow 5° beam angle
- Max. 60 m (200 ft) measurement range
- PP and aluminium sensors
- Joystick aiming device
- Plug-in display module
- 4 – 20 mA + HART® communication
- Explosion-proof models, IP67

The 4-wire **EchoTREK** compact ultrasonic level transmitters are offered for solids level monitoring tasks. **NIVELCO**'s high efficiency SenSonic narrow beam angle transducers, giving superb signal transmission, make possible that the **EchoTREK** units overcome filling noise, dusting and irregular surface formations in most cases to give a high performance, compact, powder and solids level measurement transmitter. This is provided by the QUEST+ software, using advanced process adaptive signal processing for reliable echo monitoring, offering a best-in-class solution.

EasyTREK for solids — Ultrasonic integrated

- For free flowing solid measurement
- 4-wire integrated transmitter
- Narrow 5° beam angle
- Max. 60 m (200 feet) measurement range
- PP and aluminium sensors
- Joystick aiming device
- 4 – 20 mA + HART® communication
- Explosion-proof models, IP67

The 4-wire **EasyTREK** ultrasonic level transmitters are offered for solids level monitoring tasks where previously only more complex, two part systems have performed adequately. **NIVELCO**'s high efficiency SenSonic narrow beam angle transducers, giving superb signal transmission, make possible that the **EasyTREK** units overcome filling noise, dusting and irregular surface formations in most cases to give a high performance, compact, powder and solids level measurement transmitter. This is provided by the QUEST+ software, using advanced process adaptive signal processing for reliable echo monitoring, offering a best-in-class solution.

NIVOTRACK — Magnetostrictive

- 2-wire compact and mini compact
- 0.1 or 1 mm (0.004 or 0.04 inch) res.
- Max. 15 m (50 ft) measurement range
- For liquids with min. 0.4 kg/dm^3 (400 oz/ft^3) density
- Distance, level and volume measurement
- Rigid or flexible probes
- OIML R-85 international certification
- Explosion-proof models
- FM & CSA approved

NIVOTRACK magnetostrictive level transmitters are an ideal solution for high accuracy measurement of clean fluids. Its high precision renders the **NIVOTRACK** suitable for custody transfer measurement of liquids such as fuels, solvents, alcohol derivatives etc. Units with flexible tube make this accurate measurement for higher tanks possible, and offer a more convenient way for shipment and installation. Plastic coated versions substantially expand the field of application by a wide range of aggressive materials. Integrating the transmitter into a process control system is easy thanks to the intelligent signal processing and communication software as well as the wide of range of accessories offered.

LEVEL TRANSMITTERS

NIVOCAP Capacitance

- 2-wire compact transmitter
- Rod or cable probes up to 20 m (65 feet)
- $\varepsilon_r > 1.5$
- Fully or partly insulated probes
- 32-point linearization
- High sensitivity
- 4 – 20 mA + HART® communication
- Explosion-proof models

NIVOCAP 2-wire capacitive level transmitters provide an ideal solution for level measurement of conductive or non-conductive liquids. The probe of the instrument and the reference probe operate as opposing plates of a capacitor. Between the plates of this capacitor the air is replaced by a medium with greater dielectric constant during filling the tank, therefore the capacitance is changing directly proportional to the level. The incorporated electronic circuitry measures the capacitance difference and converts it to an output signal.

NIVOPRESS N Hydrostatic borehole

- 2- or 3-wire submersible transmitter
- Plastic or stainless steel body
- Up to 200 m (656 feet) range
- 4 – 20 mA + HART® communication
- Linearity error: 0.25 %
- Incorporated Pt100 temperature sensor
- Venting tube in cable
- IP68 protection
- Explosion-proof models

The **NIVOPRESS N** hydrostatic level transmitters are designed to measure the level of clean or contaminated liquids. The pressure sensor at the bottom of the probe measures the hydrostatic pressure (Phydr) of the liquid column above it and the atmospheric pressure (Patm). The atmospheric pressure is led to the sensor through a breathing capillary which is equipped with a moisture filter to prevents the damaging the electronics. This enables the atmospheric pressure to be subtracted from the measured pressure to get the hydrostatic pressure which is proportional to the height of the liquid column (h). The electronics converts the sensor's signal into an output signal. If temp. measurement (of the liquid) is needed beside the level measurement a combined (level + tem.) transmitter should be used.

NIVOPRESS D Hydrostatic level / pressure

- 2-wire compact level and pressure transmitter
- Wide pressure range selection
- High overload capability
- Accuracy: 0.25%
- Stainless steel diaphragm
- Plug-in display module
- 4 – 20 mA + HART® communication
- Explosion-proof models

NIVOPRESS D hydrostatic level transmitters operate in 2-wire systems and convert relative or absolute pressure (input signal) into 4 – 20 mA (output signal). The piezoresistive sensor measures the hydrostatic pressure and it compares the water head with the actual atmospheric pressure. The sensor is protected by a stainless steel flush diaphragm which transfers the pressure value to the piezoresistive sensor through silicone oil. Intelligent electronics provides on-site programming with plug-in display or remote programming with HART® communication. Intrinsically safe models are available for use in hazardous environments. **NIVOPRESS D** level transmitters are suitable for level- and pressure measurement tasks in tanks, vessels and pipes especially in food and beverages industry applications. The flat surface of the diaphragm avoids the risk of material build up and the max. medium temp. of 125 °C (257 °F) allows proper (CIP) cleaning required by the regular cleaning processes of the food industry and similar hygienic applications.

NIVOFLIP Bypass level indicators

- Operation without power supply
- 500 – 5500 mm (1.65 – 18 ft) meas. range
- ±10 mm (0.4 inch) accuracy
- Stainless steel or titanium float
- Optional strap-on level switches
- Max. 100 bar g (900 psi g) proc. pressure
- DIN and ANSI flanges
- High temp. version up to +250 °C (482 °F)
- PED approval

The **NIVOFLIP** is a bypass level indicator for pressurized vessels with up to 5.5 m (18 feet) flange distance containing liquids. The device has the international PED (Pressure Equipment Directive) approval, so it can be used for level indication of pressurized vessels up to 100 bar g (900 psi g) process pressure.
The high temperature types are applicable up to 250 °C (482 °F) process temperature. The **NIVOFLIP** can be equipped with optional limit switches or with **NIVELCO**'s **NIVOTRACK** high-precision magnetostrictive level transmitter if level transmission is needed.

LEVEL TRANSMITTERS

LEVEL SWITCHES

The most frequent level instrumentation task is level control and limit level switching whether if the measurement medium is liquid or solid. This is the reason why **NIVELCO** focuses on level switches in addition to the level transmitters. **NIVELCO** has designed and manufactures instruments that offer reliable level control and limit level switching solutions for most media from potable water to sewage, aggressive alkalis and acids, or free- flowing, powdered, bulk or granular solids.

Thanks to this very wide level switch selection we are able to provide suitable instruments for most level instrumentation applications. Most of our level switches have explosion-proof versions (in accordance to ATEX and/or IEC Ex). Moreover we offer suitable solutions for special requirements, for example the ship-building industry with a need for Germanischer Lloyd (GL), Det Norske Veritas (DNV), and Bureau Veritas (BV) or SIL approvals.

NIVOFLOAT Float switches

- Hermetically moulded, double chamber
- Adjustable switch differential
- Max. 20 m (65.5 feet) cable length
- Max. +50 °C (122 °F) medium temp.
- Max. 2 bar (14.5 psi g) process pressure
- Level switch from potable water to sewage
- Low specific weight of the floating body
- Fail-safe indication and pump control
- Suitable also for tanks and basins

The **NIVOFLOAT NL-100** type floating level switch is suitable for level switching of various kinds of water such as potable water and sewage. The **NIVOFLOAT NW-100** type tilting float level switch is suitable for level switching of various liquids, especially sewage in shafts, tanks, basins or cisterns. The double-chambered float is made of injection moulded tough polypropylene that ensures good waterproof protection. The contacting microswitch is incorporated in the float.
The cable of the **NIVOFLOAT** level switch is a flexible insulated copper cable with 3 x 1 mm^2 (AWG18) cross section and PVC or Neoprene outer insulation and it fed through a waterproof sealed entry into the monolithic structure of the injection moulded plastic housing. Different control tasks such as liquid level monitoring and pump control can be accomplished with **NIVOFLOAT**.

NIVOCONT K Conductive level switches

- Low cost level switch
- Limit switch or differential switch
- Adjustable sensitivity
- Adjustable time delay
- All wetted parts stainless steel
- Compact and separated types
- For liquids with min. 10 μS/cm conductivity
- Rod probes up to 3 m (10 feet)

The **NIVOCONT K** level switches, based on the conductivity principle, can be applied to liquids with conductivity higher than 10 μS/cm. For detecting the level, probes are immersed into the tank. These probes (and the tank wall if conductive) serve as contacts of an electric circuit. Probes can be of single or multiple rod versions. A maximum of 4 probe rods can fit in the multiple probe socket with an additional reference probe if tank wall is not conductive. The probe length should be in accordance with the level to be detected. When the liquid level reaches the probe, it will create a short-circuit and the output relay will be activated. The device senses the conductivity difference between the probes and the reference probe.

NIVOMAG Magnetic coupling switches

- Low cost level switch
- Limit switch or differential switch
- Adjustable sensitivity
- Adjustable time delay
- All wetted parts stainless steel
- Compact and separated types
- For liquids with min. 10 μS/cm conductivity
- Rod probes up to 3 m (10 feet)
- Flame-proof models

The **NIVOMAG** magnetic float level switches are used for point level detection and level control of liquids in all types of vessels. Operation principle: the permanent magnet of the float activates the output microswitch by a non-contact coupling system.
The great variety of both the top and side mounted versions makes it easy to install the switch in any tank at any location. For the simplest level switching you can select models with fixed hysteresis, while for level control application we offer **NIVOMAG** switches with adjustable hysteresis. Models with rubber or silicon sleeves can be applied for contaminated liquids. You can fit the **NIVOMAG** switch with an MMK type tester, to check the switching function even when the liquid levels aren't changing.

LEVEL SWITCHES

NIVOPOINT Magnetic tracking

- Operation without power supply
- Reed switches separated from process
- Stainless steel probe and float
- PFA coated probe version with plastic float
- Up to 5 switch points
- For liquids with min. 0.4 kg/dm^3 (400 oz/ft^3) density
- Multi-point level switch in closed tanks
- Flame-proof models

The **NIVOPOINT** magnetic float level switches are suitable for single, or multipoint level controlling tasks. The device consists of a probe tube, a float incorporating a magnet and a housing containing the connection terminals. A maximum of 5 switches can be incorporated in the probe. A sliding sleeve on the top of the probe provides for a simultaneous ±25 mm (1 inch) adjustment possibility. The wetted parts are made of stainless steel. The plastic coated versions are suitable for level detecting of aggressive liquids, and the ATEX certified versions are applicable for level switching of explosive materials. Floats and process connections can be selected according to the measured medium and the application. The mini type **NIVOPOINT** magnetic float level switches are suitable for maximum level indication in small tanks. The small size and easy mounting of the switch allows maximum level detection in appliances or tanks using process connections made for different other purposes.

NIVOSWITCH for liquids Vibrating fork

- For most liquids with min. 0.7 kg/dm^3 (700 oz/ft^3) density and max. 10^4 mm^2/s (0.1 ft^2/s) viscosity
- No moving parts
- Self-cleaning for most mediums
- Stainless steel and plastic coated forks
- Rigid rod extension up to 3 m (10 ft)
- Explosion-proof models
- IP67, IP68 protection
- FM & CSA approved

The **NIVOSWITCH** vibrating fork level switches are suitable for level detection of liquids or granular, powdered solids. Units with parallel vibrating fork are suitable for liquids, units with non parallel vibrating fork are suitable for solids. Mounted on pipes, silos, tanks or hopper bins it can control filling / emptying, also can generate fail-safe alarms providing overfill- or dry run protection. The operation principle is based on that the electronic circuit excites a vibration in the fork probe. When the medium reaches and covers the fork, its vibration changes or stops. The fork will start vibrating again as the medium sets it free. The electronics senses the change of vibration and gives output signal after a selected delay. The plastic coated version is recommended to use for aggressive mediums, the highly polished version is recommended to use for abrasive mediums. The PNP/NPN transistor output versions can be connected directly to PLC, or relay unit. **NIVOSWITCH** vibrating forks are able to solve switching tasks of high-current loads with the help of **UNICONT PKK** switching amplifiers. **UNICONT PKK-312-8 Ex** is a recommended intrinsically safe switching unit designed for Ex rated vibrating forks.

NIVOSWITCH for solids Vibrating fork

- For powdered solids with min. 0.01 kg/dm^3 (10 oz/ft^3) density
- No moving parts
- Stainless steel forks
- Self-cleaning for most mediums
- Rigid rod extension up to 3 m (10 ft)
- IP67, IP68 protection
- Explosion-proof models

NIVOCONT R Vibrating rod

- Operation without power supply
- Reed switches separated from process
- Stainless steel probe and float
- PFA coated probe version with plastic float
- Up to 5 switch points
- For liquids with min. 0.4 kg/dm^3 (400 oz/ft^3) density
- Multi-point level switch in closed tanks
- Explosion-proof models

The **NIVOCONT R** series of vibrating rod level switches are robust instruments designed for low and high level indication of granules and powders with a minimum of 0.05 kg/dm3 (50 oz/ft3) density. Mounted on tanks, silos or hopper bins it can control filling / emptying, or give fail-safe alarm signals. The highly polished version is recommended to use for abrasive mediums. The operation principle is based on that the electronic circuit excites a vibration in the rod probe. When the medium reaches and covers the rod, its vibration stops, when the medium leaves the rod it returns to vibrate freely. The electronics senses the change of vibration and gives output signal after a selected delay.

NIVOROTA Rotary paddle

- For granular solids with min. 0.1 kg/dm^3 (50 oz/ft^3) density
- Plastic or aluminium housing
- Stainless steel wetted parts
- Motor shut-off feature
- Single or 3-vane paddles
- Rod or cable extended versions up to 3 m (10 feet)
- High temperature version
- IP67 protection
- Explosion-proof models

The **NIVOROTA** rotary paddle level switch series of well-known **NIVELCO** design can be used for detecting the level of lumpy or powdery materials and granules. Mounted to tanks, silos and hoppers it can monitor and control level, filling and emptying of stored materials such as stone, fly ash, sand, coal, feed, beet slice, etc. A small power electric motor drives the paddle which rotates freely in the absence of the material. When the paddle is immersed by the material reaching it, the motor will be switched off the same time triggering the output contact switch.
When the material level drops the paddle runs free again, the motor is reactivated and the switch returns to its original state.
The **NIVOROTA E-700/800** series rotary paddle level switches provide all the advantageous features of the previous series in one unit. Dust Ex versions are available for use in hazardous environments.

NIVOCAP CK RF capacitance

- For solids with $\varepsilon_r \geq 1.5$ and liquids
- For adhering, sticky materials
- Easy calibration
- Selectable sensitivity
- Buid-up immunity
- Rod or cable extended versions up to 10 m (33 feet)
- High temperature version
- IP67 protection
- Explosion-proof models

The **NIVOCAP CK** capacitance level switches operate as capacitance meters in the RF (radio-frequency) range providing great immunity to build-up. **NIVOCAP CK-100** is an excellent choice for those adhering, sticky substances where other contact measurement technologies are not suited. The mechanical construction consists of a stainless steel probe and a reference probe between two insulations.
The intelligent microcontroller based electronics evaluates continuously the voltage level proportional to the capacitance difference between the two probes and the housing. This way it provides more stabile measurement compared to the analogue capacitance switches. The units are available only with paint coated aluminium housing, because one reference point of the measurement is the housing itself. An insulated section of the probe called the guard-ring allows that the material build-up on the probe can be ignored preventing false switching. The maximum probe length is 3 meter (10 feet) for extended rod probes and the cable extended versions available up to 10 meter (33 feet) probe length. The high temperature and the Dust-Ex approved models are suitable for using in harsh environments.

LEVEL SWITCHES

LIQUID ANALYTICAL TRANSMITTERS

There is a constant demand for analytical measurements in practically all industries. Analysis of fluids and reliable control over the feeding of various chemicals is especially crucial in the water and wastewater, pharmaceutical, chemical, food and beverage, power industries. **NIVELCO**'s **AnaCONT** analytical range provides HART®-capable transmitters for pH, ORP, dissolved oxygen and conductivity measurement.

All the three transmitters are available in compact, integrated and remote mount types. The **AnaCONT LCK** mini compact conductivity transmitters provide various mounting positions making possible their use in diverse industrial applications.

AnaCONT LEP pH transmitters

- 2-wire pH transmitters
- Compact and integrated transmitters
- PP or PDVF sensor housing
- Measuring range: pH: 0 – 14
- Replaceable electrodes
- Temperature compensated
- 4 – 20 mA, HART® communication
- Remote mount versions up to 10 m (33 ft)
- IP67, IP68 protection
- Explosion-proof models

Continuous measurement of acidity (pH<7) and of basicity (pH>7) liquids can be performed by the help of **AnaCONT LEP** transmitters. The necessary feeding of chemicals and other technological functions can be controlled by the processed measured values. The potential difference between the submerged measuring and reference probe generates a voltage proportional to the concentration of the hydrogen ion in the measured fluid. This voltage is evaluated by the signal processing electronic module of the instrument. Based on the signals of the submerged probe and the temperature sensor the smart signal processing electronic module calculates a pH value normalized to 25 °C (77 °F) and generates a proportional output signal. The long term stability and accuracy of the measurement requires a periodic calibration of the sensors using the standard buffer solutions.

AnaCONT LER ORP transmitters

- 2-wire ORP transmitters
- Compact and integrated transmitters
- PP or PDVF sensor housing
- Measuring range: ORP: ±1000 mV
- Replaceable electrodes
- Temperature compensated
- 4 – 20 mA, HART® communication
- Remote mount versions up to 10 m (33 ft)
- IP67, IP68 protection
- Explosion-proof models

The **AnaCONT LER** instruments are designed to measure redox potential values of liquids and aqueous solutions. Similarly to the pH measurement, the measurement of the redox potential is based on the potential difference between measuring and reference probes. Oxidation or reduction occurs on the platinum surface of the measuring probe. Redox potential is a parameter that indicates the sum of oxidants and reducers in the measured medium. The output signals of the probes are processed by the electronic unit and it converts them into a proportional output signal. In order to get the desired medium parameters the reduction of liquids or feeding of suitable oxidant is executed based on the formerly processed values.

AnaCONT Dissolved oxygen transmitters

- 2-wire DO transmitters
- Compact transmitters
- PP or PDVF sensor housing
- Measuring range: 0 – 20 ppm
- Replaceable probes
- Temperature compensated
- 4 – 20 mA, HART® communication
- Power relay output
- Remote mount versions up to 10 m (33 ft)
- IP67, IP68 protection
- Explosion-proof models

The **AnaCONT LER** instruments are designed to measure redox potential values of liquids and aqueous solutions. Similarly to the pH measurement, the measurement of the redox potential is based on the potential difference between measuring and reference probes. Oxidation or reduction occurs on the platinum surface of the measuring probe. Redox potential is a parameter that indicates the sum of oxidants and reducers in the measured medium. The output signals of the probes are processed by the electronic unit and it converts them into a proportional output signal. In order to get the desired medium parameters the reduction of liquids or feeding of suitable oxidant is executed based on the formerly processed values.

LIQUID ANALYTICAL TRANSMITTERS

AnaCONT Conductivity transmitters

- 2-wire EC transmitters
- Mini compact type
- Stainless steel sensor housing
- Measuring range:
- 1 µS/cm – 2 mS/cm
- Optional plug-in
- 4-digit LED display
- 4 – 20 mA, HART® communication
- IP68 / IP65 protection

The **AnaCONT** 2-wire mini compact conductivity transmitters are designed to measure the conductivity of a liquid and convert the input signal to 4 – 20 mA output. They are suitable for measuring clean, non-crystallisable liquids.
The design of the transmitter, the wide temperature range and various mounting positions make possible the use in diverse industrial applications. Two probes are immersed into the measured liquid.
The distance between the probes and their surface define the cell constant (K) of the instrument. The cell constant defines the measuring range and thus the application area.

FLOW MEASUREMENT

NIVELCO's open channel flow metering system offers 9 different sizes, compact types of **PARSHALL** flumes made of plastic (PP). The flume together with **EasyTREK/EchoTREK** ultrasonic level transmitter and **MultiCONT** process controller is able to create a complete flow-measurement system.

The **NIVOSONAR GPA** enables flow measurements on gravitational sewers, brook channels, irrigation channels or any other open channel with the help of a **PARSHALL** flume.

NIVOSONAR Open channel flow measurement

- 9 different sizes, compact types of PARSHALL flumes made of plastic
- Factory calibrated dimensions
- Range: 0.28 to 1850 l/s (35.6 to 235195 ft³/h)
- Level transmitter to be ordered separately: EasyTREK or EchoTREK
- 4 – 20 mA, HART® communication
- For open channels, treated effluent sewage measurements
- Certification of measurement

The **PARSHALL** flume is a rigid, polypropylene structure with narrow tolerances to ensure high accuracy of metering, therefore during transport and installation great care should be taken to prevent the flume from getting deformed. The measuring flume is easy to install in new or existing channel structures.
With the **PARSHALL** flume applied as a reducing element, the stagnation pressure causes the liquid level to rise. This change in level is in proportion with the velocity of the liquid and the flow rate. The **EasyTREK/EchoTREK** ultrasonic level transmitter measures the change in level and transmits measurement data via HART® communication to the **MultiCONT** multichannel process controller.
The ultrasonic level transmitters can be remote programmed via HART® by **UNICOMM** HART®-USB/RS485 modem or **MultiCONT** and data logging can be also realized besides displaying or transmitting measurement data on RS 485 line into PC.

FLOW MEASUREMENT

TEMPERATURE

The most frequently measured physical parameter in the modern process automation industry is the temperature. **NIVELCO**'s **THERMOCONT** product range is designed specially for the purpose of measuring this important parameter. The product line starts with a simple Pt100 temperature sensor and ends with high temperature version transmitters with Ex d flameproof housing and HART® communication. Number of the order code variations and special types is very high, so **NIVELCO** is able to provide suitable solution for most applications from the wide range of **THERMOCONT** instruments.

The **THERMOCONT** product family can be divided into two major parts considering the output possibilities. The **THERMOCONT TT** transmitters have 4 – 20 mA output and as an option these devices are digital HART® communication capable. The **THERMOCONT T** temperature sensors have a robust outer protection tube which can PFA coated. The max. medium temperature of these instruments is +600 °C.

THERMOPOINT Multipoint transmitters

- 2-wire multipoint temperature transmitter
- Temperature measurement of powdered, granular solids or liquids
- Max. 15 sensors / probe
- Max. 30 m (100 feet) probe length
- Temperature trend monitoring
- -40 °C … +125 °C (-40 °F … +257 °F) range
- HART® communication
- Explosion-proof models

The **THERMOPOINT** temperature transmitters are suitable for continuous multipoint temperature-measurement, -indication and -transmission of normal and hazardous liquids, powders or granular solids. Temperature of grain, feed stored in silos needs to be monitored for maintaining quality. Monitoring of the total volume is needed to provide information on accidental quality loss or appearance of germs or fungus. Eventual temperature increases will alert the operator to perform operation or recycling the medium. Temperature measurement is done by electronic temperature sensors placed at equal distances in a plastic coated stainless steel flexible tube. Each sensor sends the actual measured temperature to the transmitter head.
The transmitter head communicates through HART® protocol with control room devices such as a **MultiCONT** or a PC, for further processing. The advantage of using a multifunction **MultiCONT** based system is that a new transmitter (for example, if level measurement is required) can easily be inserted into the existing loop, using the existing HART® communication.

THERMOCONT TT Temperature transmitters

- -40 °C … +600 °C (-40 °F … +1112 °F) range
- Plug-in display module
- 4 – 20 mA + HART® communication
- Integral "A" or "B" class Pt100 probe
- Probe length up to 3 m (10 feet)
- Stainless steel or PFA coated probes
- Heavy duty field mountable housing
- Multiple head positions
- Explosion-proof models

The **THERMOCONT TT** field devices are 2-wire temperature transmitter with 4 – 20 mA analogue output with optional plug in display. Intrinsically safe version of each model is available in ordinary or flame-proof housing. The measured temperature can also be transmitted by HART® communication. The **THERMOCONT TT** temperature transmitters are suitable for temperature measurement of liquids in tanks and pipes and free flowing or powdered solids, but also applicable for gases. Wall mounted versions are available for ambient temperature measurements. The PFA coated stainless steel probe makes measurement of very aggressive materials also possible. The reinforced temperature probe version is an ideal solution for meeting the requirements of the oil-, gas- and heavy chemical industries. As special version of the unit a remote transmitter is also available which can be connected to a standard Pt100 sensor through a simple 4-wire cable.

TEMPERATURE

THERMOCONT T Temperature sensors

- -40 °C … +600 °C (-40 °F … +1112 °F) range
- Resistance Temperature Detectors
- "A" or "B" accuracy class
- 2- or 4-wire types
- Probe length up to 3 m (10 feet)
- Stainless steel or PFA coated probes
- Explosion-proof models

The **THERMOCONT T** temperature sensors are able to cover almost all demands in the area of industrial temperature measurement with the numerous versions and multiple kinds of applicable probes. PFA coated probe versions with teflon inserted steel flange are applicable for chemical and petrochemical applications where aggressive mediums could damage steel probes.
The vibration-resistant versions are suitable for special applications where the measurement is exposed to high vibrations. Special versions are also available for unique technologies and industrial processes along with the standard models.

THERMOCONT TN/TX Temperature sensors

- Heavy duty, strengthened version
- Pt100 or thermocouple sensor
- Drilled stainless steel thermowell
- 2- or 4-wire types
- Probe length up to 1000 mm (3.3 feet)
- Vibration-resistant construction
- Temperature sensors for gases
- Explosion-proof models

The strengthened probe versions of **THERMOCONT T** series are designed primarily for oil, gas and steam pipeline industrial applications.
The shock proof stainless steel construction includes the inner and outer (double) tube and well, the welded flange.
This type is also provides suitable solution for all applications where robust design is advantageous.

UNICONT PM-400/500 Universal controllers

- Dual line 4-digit LED display
- Pt100, Ni100, J, K, S type. sensor,
- 4 – 20 mA or 0 – 10 V input
- Up to 3 power relays
- ON-OFF, PD or PID control
- Auto tuning
- Transmitter power supply
- Heating / cooling control

The **UNICONT PM-400** and **-500** series universal controllers are 1/16 DIN (48 x 48 mm) process controllers with relay and analogue outputs or PID algorithm supporting versatile functions. The universal analogue PID-controllers can be used with a Pt100 resistance thermometer and with different thermocouples for temperature measurement, control as well as processing the signals of transmitters with 4 – 20 mA and 0 – 5 V DC or 0 – 10 V DC output. The output signal of the controller can be a relay, continuous 4 – 20 mA process current signal or SSR-driver. Additional alarm relay provides for limit monitoring. The unit is microprocessor based, has an auto-tuning software, automatic and its PID controller is able to find the optimum of the P-I-D constants. The **UNICONT PMM-500** series are able to communicate on RS485 line and also able to provide power supply for transmitters.

UNICONT PM-300 Universal controllers

- Programmable inputs
- 4 digit LED display
- Relay contacts or analogue output
- 4 – 20 mA output
- ON/OFF, PD or PID control algorithm
- Auto tuning feature
- Relay outputs up to 4 pcs
- 32 point linearization
- Window comparator differential metering

The **UNICONT PM-300** is a universal, one or two-channel process controller with relay and analogue outputs and PID algorithm supporting versatile functions. It can be used from standard to extraordinary temperature control (cooling, heating) tasks. Beside the usual inputs, practically all generally used temperature sensors can be connected.
Due to its auto tuning feature the controller can successfully handled by technicians unaccustomed to the process control. The dual 4-digit lighting displays allow viewing even from greater distances.
The **UNICONT PM-300** is highly accurate and easy to handle, thus suitable for applications as panel instrument both in laboratory and industrial process control applications.

INDUSTRIAL SENSORS

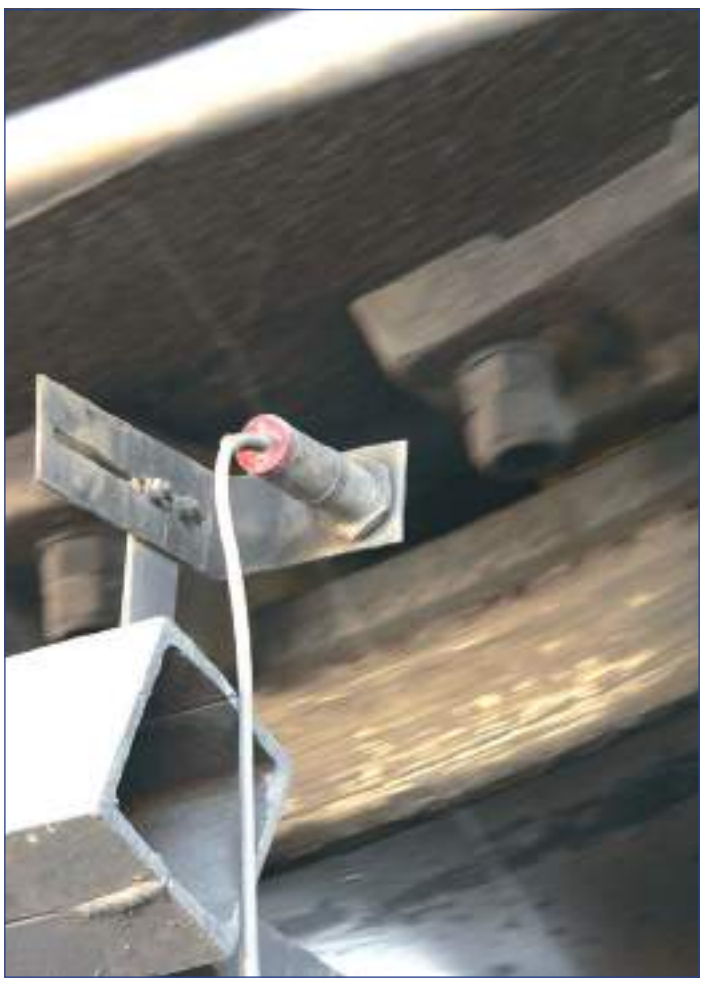
Non-contact proximity switches are also very popular devices of the industrial process automation. The **MICROSONAR** ultrasonic proximity sensors provide ideal choice for simple applications where the use of higher performance units such as **EasyTREK/EchoTREK** is not needed.

The **MICROSONAR** proximity sensors use non-contact ultrasonic principles to detect and measure the position of an object. They act as proximity switches, or transmit the measurement of the distance from sensor face to the target.

MICROSONAR Ultrasonic Proximity sensors

- Heavy duty, strengthened version
- Pt100 or thermocouple sensor
- Drilled stainless steel thermowell
- 2- or 4-wire types
- Probe length up to 1000 mm (3.3 feet)
- Vibration-resistant construction
- Temperature sensors for gases
- Explosion-proof models

The **MICROSONAR** proximity sensors use non-contact ultrasonic principles to detect and measure the position of an object.
They act as proximity switches, or transmit the measurement of the distance from sensor face to the target. For transmitter models the output signal is either 4 – 20 mA or 0 – 10 V, which can be assigned to any part of the nominal range. Switching points of the proximity switch option can be set to any point within the range.



PRESSURE SENSORS

In the world of industrial metrology, monitoring and controlling the pressure of fluids and gases and the processing of the measured results are high priorities. **NIVELCO** covers the needs of several industries and application areas (such as hydraulics, pneumatics, HVAC, mechanical and plant engineering, oil and gas industry, chemical industry, energy industry, food and beverage industry) with the wide selection of the **NIPRESS** family. The **NIPRESS** device family features advanced pressure measuring technologies with relative and absolute pressure measurement. The industrial sensors are suitable for nearly all medium with several accuracy classes and mounting options. The devices have excellent overload resistance, 2- and 3-wire systems and can be ordered with lots of different electrical and process connections. We offer solutions for rough conditions (aggressive medium, wide temperature range, dynamic pressure changes) and high hygiene requirements.

NIPRESS DK — Pressure switches

- Hermetically moulded, double chamber
- Silicon, ceramic or stainless steel sensor
- Relative or absolute measurement mode
- Up to 4 contacts
- Rotatable and configurable 4-digit display module
- Versions configurable via PC or programming device
- Stainless steel housing versions
- Ex ia versions*
- Integrated cable version

The electronic pressure switches can be used in hydraulic and pneumatic applications for monitoring and controlling the pressure with switching outputs. The devices are easily programmable either by the optionally available tools P-Set (PC software and programming adapter) or via the programming device P6. Due to the simple handling as well as the variety of software features the **DK-300**, **DK-400** and **DK-500** intelligent switches are especially suitable as a pressure switch for general plant and machine construction and for the processing industry.

NIPRESS D — Pressure transmitters

- Ceramic or stainless steel sensor
- Relative or absolute measurement mode
- For high pressure (up to 2000 bar)
- For vacuum, overpressure and absolute pressure measurement
- Measurement range downscale
- HART® communication versions
- Two chamber aluminium die cast or stainless steel housing
- Ex ia or Ex d versions*
- SIL 2 version*

The wide selection of pressure measuring technologies, housing materials (stainless steel, plastics) provides possibility to complete almost all gas and fluid pressure measurement tasks. Their design, high overload capability and the possibility to install the units in any physical position allows for a wide range of industrial applications.

NIPRESS DD — Differential transmitters

- Piezoresistive silicon or st. steel sensor
- Relative measurement mode
- Measurement range downscale
- Up to 2 contacts
- Aluminium die cast housing
- Static overpressure 400 bar
- HART® communication versions
- High accuracy
- Mechanical robust versions
- HASTELLOY® sensor version
- Ex ia versions*

Thanks to different sensor technologies combined with compact aluminium die-cast cases or plastic housings, our differential pressure transmitters may be used for numerous fluids and gases, e. g. for monitoring ventilation ducts, filters and fans in HVAC areas as well as for level measurement ín closed pressurized tanks.

* Ex or SIL versions are available only on request for custom price.

PRESSURE SENSORS

SYSTEM COMPONENTS

The wide product portfolio of **NIVELCO** requires many types of system accessory components. These devices facilitate the integration of **NIVELCO**'s level instruments to process control systems.
The system component range consists of process controller units, universal displays, loop displays, interface and other expanding modules, time relays, etc. The **UNICONT PGK** intrinsically safe isolator power supply modules provides intrinsically safe power for 2 wire transmitters operating in hazardous locations and ensure galvanic insulation between input and output. The special feature of the unit is its high accuracy signal conversion. The **UNICOMM SAK-305** communication modules are able to communicate between the HART®-capable field transmitters and the process controller PC-s or PLC-s, via USB or RS485 communication line.

MultiCONT — Multichannel process controller

- Programmer, display and controller for transmitters with HART® protocol
- 1 to 15 input channels
- 4 – 20 mA, HART®, RS485 output
- Datalogger function
- SD card slot
- Expandable with interface modules
- Highly informative Dot-Matrix display
- Explosion-proof models

The **MultiCONT** unit is a universal interface between **NIVELCO**'s HART®-capable intelligent level transmitters and the other elements of the process control system like the PC-s, PLC-s, displays and the actuators. Besides its role as an interface, the **MultiCONT** ensures the powering of the 2-wire transmitters while being capable of complex control tasks. The unit supports communication with a max. of 15 standard or 4 Ex ia certified **NIVELCO** transmitters. Remote programming of the transmitters and downloading of the parameters and measured data is possible using the **MultiCONT**. The various outputs such as 4 – 20 mA, relays and digital outputs can be controlled using measured values and new values calculated from the measured values. The large dot-matrix display allows visualisation of a wide range of informative display functions. One special feature is the "Echo-Map" visualisation when communicating with **NIVELCO**'s **EchoTREK** and **EasyTREK** transmitters.

UNICONT PJK — Universal interface module

- MultiCONT expanding module
- RS485 communication
- Output variations:
  - 2x current outputs
  - 2x relay outputs (250 V AC, 8 A)
  - 1x current output and 1x relay
- DIN rail mountable
- Galvanic isolation
- Level controlling and limit level indication

The **UNICONT PJK** series is a universal interface module that can be controlled via RS485 line, and (depending on type) provides relay(s) and/or 4 – 20 mA current output(s). The **UNICONT PJK-100** universal interface modules provide essential solution if the number of relays or current outputs of the **MultiCONT** is not enough in a system. The device can be used also as a peripheral unit for PLC or PC controlled process control systems communicating via MODBUS protocol. The sum of relays in the **UNICONT PJK-100** extension modules and the **MultiCONT** must not exceed 64, and the sum of analogue outputs (4 – 20 mA) must not exceed 16. There is a special module with both relay and current output in the variety of the **UNICONT PJK** series. The maximal number of these modules may be 32.

UNICONT PKK — Current controlled switches

- 4 – 20 mA input
- DIN rail mountable
- Able to power 2-wire transmitters
- Galvanic isolation
- Power relay (SPDT) output
- Switching amplifier for vibrating forks
- Wire state monitoring
- Explosion-proof models

The **UNICONT PKK-312** series is a 4 – 20 mA current controlled limit switch featuring galvanic isolation also available as an intrinsically safe unit.
The input 4 – 20 mA signals can be transferred from passive or active outputs of 2- or 4-wire transmitters. The value of the input signal will be compared in the unit with the set (taught) value and the state of the galvanically isolated relay changes in accordance with the comparison mode programmed.
The **UNICONT PKK-312-8 Ex** is a special version, designed to cooperate with Ex rated **NIVOSWITCH** vibrating fork level switch, as an intrinsically safe power supply and amplifier unit.

SYSTEM COMPONENTS

UNICONT PD Loop Indicators

- 4 – 20 mA loop operated
- Operation without external power supply
- 6-digit plug-in LCD display
- 20 mm (0.75 inch) digit height
- Universal field indicator for any transmitters
- 4 – 20 mA / HART® converter version
- Stainless steel flameproof housing
- Explosion-proof models

The **UNICONT** series 2-wire passive loop-indicators are universally scalable process value indicators, they find their use where the process value has no control function. The 3-wire HART® converter type **UNICONT** devices offer the optimal solution where local displaying is needed besides the remote data processing and the field transmitters having 4 – 20 mA output are needed to be integrated into HART® multidrop system.
The devices are applicable not only for **NIVELCO** transmitters, but for all transmitters which use standard 4 – 20 mA output. Robust enclosure makes applications under harsh conditions also possible. The **UNICONT PDF-600** series with flameproof (Ex d approved) stainless steel housing meets the special requirements of certain industry segments, such as Food and Beverage, Marine, Oil and Gas.

UNICONT PLK Loop Indicators

- 4 – 20 mA input
- 4-digit LED indicator
- Rotatable display
- Operation without external power
- PNP switch output
- IP65 protection

The **UNICONT PLK-501** type plug-in displays with 4-digit LED indicator can be connected to the 2-wire transmitters with its DIN 43650 connector (such as **NIPRESS** pressure gauge / transmitter, **AnaCONT LCK** conductivity transmitter).
The displayed numerical values can be freely scaled to the current input by the user, setting the maximum and the minimum value.

UNICONT PGK Ex isolator power supply

- Isolated power supply for intrinsically safe transmitters
- For transmitters operating in hazardous applications
- 4 – 20 mA, HART® communication
- For high precision transmitters
- Up to 5 ms response time
- Up to 1 μA transmission accuracy
- Explosion-proof models

The **UNICONT PGK-301** intrinsically safe isolator and power supply modules are suitable for providing power supply for transmitters operating in hazardous applications, isolating the input, output and supply voltage galvanically. Moreover the device perform high accuracy signal transmission with 4 – 20 mA or HART® communication between Ex and non-Ex areas.
The **UNICONT PGK-301** intrinsically safe isolators perform signal transmission to the non-Ex Zone with microprocessor controlled digital signal processing, which provides transmission accuracy up to 1 μA.

NIPOWER Power supply

- Output voltage: 12 / 24 V DC
- Output current: 2500 mA / 1250 mA
- Stabilized DC output
- Switching-mode power supply
- Short-circuit protection
- Overload protection
- Overvoltage protection
- DIN rail mountable

The rail mountable **NIPOWER** switching-mode power supply modules provide 12 V or 24 V stabilized DC output for low power consumption devices.

SYSTEM COMPONENTS

UNICONT PSW — Ultrasonic pump control system

- Low cost automatic pump control system
- Ultrasonic level measurement
- 0.4 – 3 m (1.3 – 10 ft) measurement range
- Programmable pump cycling
- Controlling of one-phase pumps
- Incorporated circuit breaker
- IP68 protected sensor

The low-cost **UNICONT PSW** pump control unit is designed for fully automatic level control of small domestic or communal sewage shafts, sumps or wetwells. An IP68 protected ultrasonic level transmitter performs continuous level measurement and delivers 4 – 20 mA level data to the **UNICONT PSW** unit featuring a user programmable controller. This controller featuring relay output incorporated in the **UNICONT PSW** directly controls the single phase pump acting in the sump, well, etc. The current controlled switch operates in differential level switch mode as default, the low and high levels are programmable.

NITIME — Time relay

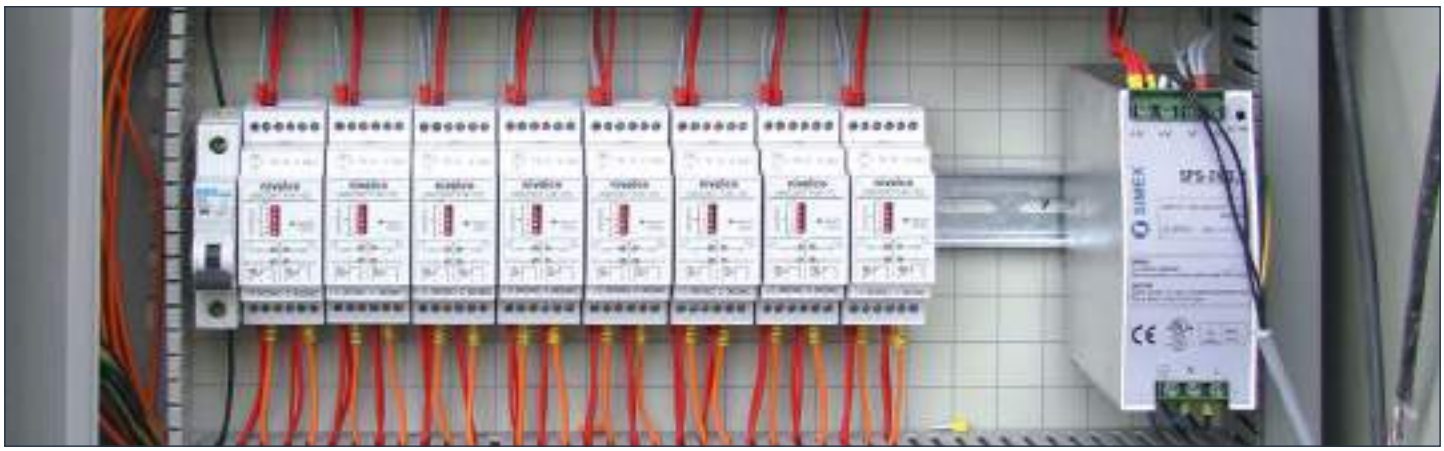
- 2 and 10 function types
- Wide time range: from 0.1 sec – 100 days
- Small size
- Universal power supply voltage
- DIN rail mountable
- Relay output

The **NITIME** time relays are suitable for all kinds of timing tasks of technological equipments.
Microprocessor controlled operation, many functions, universal power supply voltage, and slim module width are the main characteristics making **NITIME** time relays applicable also for automation tasks of lights, pumps, heating, coolers, fans or motors.

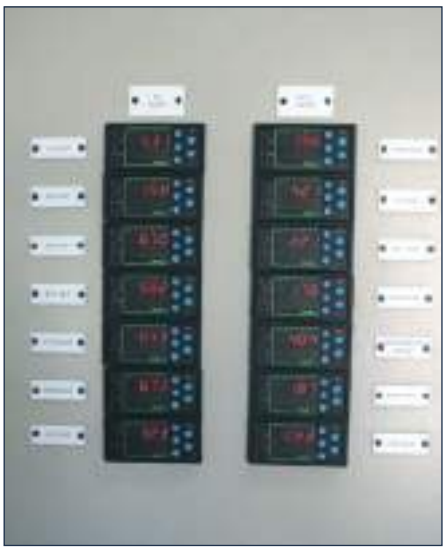
UNICOMM — HART® modem

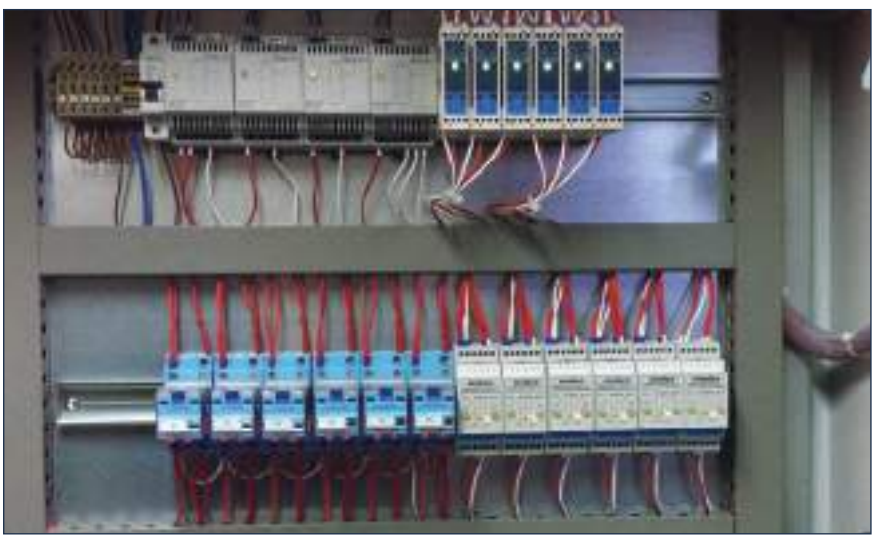
- HART®–USB/RS485 modem
- DIN rail mountable version
- Test clip connector version
- No need for power supply
- Galvanic isolation
- Explosion-proof models

The **UNICOMM** interface modules are able to establish communication line between HART®-capable field devices and process controller computer. The **UNICOMM** HART® modems are applicable not only for **NIVELCO** transmitters, but for all HART®-capable transmitters which use standard HART® communication. The **UNICOMM SAK-305** modules can be connected into a suitable device with RS485 interface input, used as a HART®–RS485 modem. The communication protocol is HART® on the RS485 line. In this case the device needs external power supply. The Ex versions can be connected to transmitters placed in hazardous areas.



SYSTEM COMPONENTS





SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

LEGEND:

- 1 = excellent
- 2 = excellent with plastic coated probe
- 3 = consult with NIVELCO for details
- / = not applicable

NIVELCO earned recognition primarily with its level transmitters, and gained a substantial global market share, based on its 3 decades of constant investment in technology. Supported by our wide base of level know-how, we wish to share our experiences in the field of applications with our readers. The chart below is not complete but covers a fairly wide spectrum of mediums typical for the most important industry segments. The actual application parameters and customer requirements should be taken into consideration. The content of the chart is only informational, please regard it as a recommendation.

For Liquids			Continous Level Measurement								Point Level Detection			
INDUSTRY	Medium to be measured	Relative Dielectric Constant (ε_r)	PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFLIP	NIVOTRACK	EasyTREK EchoTREK	NIVOMAG	NIVOPOINT	NIVOSWITCH	NIVOCAP CK
Agriculture	Fertilizer (aqueous solution)	conductive	1	1	1	1	/	1	3	1	3	3	3	1
	Manure	conductive	1	1	/	/	/	/	/	1	/	/	/	1
Construc-tion Mat.	Calcium carbonate aqueous solution	conductive	1	1	/	/	/	/	/	1	3	/	/	1
	Slacked lime (lime hydrate) / Lime milk ($Ca(OH)_2$)	conductive	1	1	/	/	/	/	/	1	/	/	/	1
Chemical Industry	Liquified ammonia (NH_3)	17–25	/	/	1	/	/	3	3	/	1	1	3	/
	Ammonium hydroxide (NH_4OH)	conductive	1	1	1	1	/	1	1	1	1	1	1	3
	Ammonium chloride (NH_4Cl) aqueous solution	conductive	1	3	3	/	/	/	2	3	3	2	2	3
	Boric acid (H_3BO_3) aqueous solution	conductive	1	1	1	3	2	3	1	1	1	1	1	1
	Carbon tetrachloride (CCl_4) dry	2.3	1	1	1	/	2	1	1	1	1	1	1	/
	Ether, diethyl-ether ($(CH_3CH_2)2O$	3.1–4.4	1	1	1	/	/	1	1	3	1	1	1	/
	Formaldehyde (HCHO) in H_2O, Formalin	23	1	1	1	1	1	1	1	1	1	1	1	/
	Fluorosilicic acid ((H_2SiF_6) in H_2O)	conductive	1	1	1	3	1	1	1	3	1	1	1	1
	Glycerol (glycerine, glycerin) ($HOCH_2CH(OH)CH_2OH$)	42.5–47	1	1	1	1	1	1	1	1	1	1	1	1
	Ethilene Glycol ($[CH_2OH]_2$)	37–41.2	1	1	1	1	1	1	1	1	1	1	1	1
	Hydrochloric acid (HCl)	conductive	3	2	3	/	/	/	3	3	/	3	2	/
	Ferric chloride (($FeCl_3$) in H_2O)	conductive	2	2	3	/	3	/	2	1	/	2	2	/
	Nitric acid (HNO_3)	conductive	3	2	/	/	/	/	/	/	/	/	2	/
	Formic acid (HCO_2H)	conductive	2	2	2	/	/	3	2	3	/	2	2	3
	Phosphoric acid (H_3PO_4)	conductive	1	1	1	3	3	1	3	1	1	3	1	1
	Sodium chloride (($NaCl$) in H_2O)	conductive	1	1	/	/	/	/	3	1	1	3	2	3
	Sodium hydroxide, Caustic soda (($NaOH$) in H_2O)	conductive	1	1	/	3	3	3	3	1	1	3	1	1
	Sodium hypoclorite (($NaOCl$) in H_2O), Bleach	conductive	1	2	/	/	3	/	2	1	/	/	2	/
	Potassium permanganate (($KMnO_4$) in H_2O), Permanganate of potash solution	conductive	1	1	1	1	1	1	1	1	1	1	1	1

SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

For Liquids			Continous Level Measurement								Point Level Detection			
INDUSTRY	Medium to be measured	Relative Dielectric Constant (ε_r)	PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFLIP	NIVOTRACK	EasyTREK EchoTREK	NIVOMAG	NIVOPOINT	NIVOSWITCH	NIVOCAP CK
Chemical Industry	Potassium hydroxide ((KOH) in H_2O)	conductive	1	1	/	3	3	3	3	1	1	3	1	1
	Hydrogen peroxide (H_2O_2)	84	1	1	1	1	1	1	1	1	1	1	1	1
	Sodium bisulfite ((NaHSO$_3$) in H_2O)	conductive	2	2	1	/	3	/	2	1	3	2	2	3
	Sulfuric acid (H_2SO_4)	84	2	2	3	/	/	/	2	1	/	2	2	/
	Chloroform ($CHCl_3$)	3.7–5.5	1	1	1	3	3	1	1	3	1	1	1	1
	Cyclopentane (C_5H_{10})	2	1	1	1	1	3	1	1	3	1	1	1	/
	Cyclohexane (C_6H_{12})	2	1	1	1	1	3	1	1	3	1	1	1	/
	Hexane (C_6H_{14})	1.8	1	1	1	1	3	1	1	3	1	1	1	/
	Dichloroethylene (CH_2CCl_2)	2.1–10.3	1	1	3	1	1	1	1	3	1	1	1	/
	Trichloroethane (CH_3CCl_3)	7.2	1	1	1	1	1	1	1	3	1	1	1	/
	Dichloromethane / methylene chloride (CH_2Cl_2)	8.9–9.1	1	1	1	1	1	1	1	3	1	1	1	/
	Acetic acid (CH_3COOH), Vinegar	conductive	1	1	1	1	1	1	1	3	1	1	1	/
	Painting and varnish agents diluted with water (non-explosive)	conductive	1	1	1	3	/	3	3	1	3	3	3	1
	Painting and varnish agents diluted with explosive agents	conductive	1	1	1	3	/	3	3	3	/	/	/	/
	Benzene, benzol (C_6H_6)	1.9–3.2	1	1	1	3	3	1	1	3	1	1	1	/
	Styrene / ethenylbenzene (C_8H_8)	2.3	1	1	1	1	3	1	1	3	1	1	1	/
	Xylene ($C_6H_4(CH_3)_2$)	2.3	1	1	1	1	3	1	1	3	1	1	1	/
	Chlorobenzene (C_6H_5Cl)	6	1	1	1	/	3	1	1	3	1	1	1	/
	Acetone ($(CH_3)_2CO$) Dimethylketone	21.5	1	1	1	1	3	1	1	3	1	1	1	/
	Lactic acid ($CH_3CH(OH)COOH$)	conductive	1	1	1	/	/	/	3	3	3	3	3	/
	Ethyl alcohol (CH_3CH_2OH)	24.3	3	1	1	1	3	1	1	1	1	1	1	/
	Ethyl acetate ($CH_3COOCH_2CH_3$)	6	3	1	1	1	3	1	1	1	1	1	1	/
	Methyl alcohol (CH_3OH)	33–56.6	3	1	1	1	3	1	1	1	1	1	1	/
	Isopropyl alcohol ($(CH_3)_2CHOH$)	18.3	1	1	1	1	3	1	1	1	1	1	1	/
	Toluene (C_6H_5-CH_3)	2.0–2.4	3	1	1	1	1	1	1	3	1	1	1	/

SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

For Liquids			Continous Level Measurement								Point Level Detection			
INDUSTRY	Medium to be measured	Relative Dielectric Constant (ε_r)	PiloTREK	MicroTREK	NIVOCAP	NIVOPRESS D	NIVOPRESS N	NIVOFLIP	NIVOTRACK	EasyTREK EchoTREK	NIVOMAG	NIVOPOINT	NIVOSWITCH	NIVOCAP CK
Food and Beverage	Beer	conductive	1	3	3	1	/	/	/	3	3	3	1	3
	Citric acid ($(C_6H_8O_7)$ in H_2O)	conductive	1	1	1	3	/	/	2	1	3	2	1	3
	Coconut oil	2.9	1	1	1	1	/	1	1	1	1	1	1	1
	Palm oil	1.75	1	1	1	1	/	1	1	1	1	1	1	1
	Animal fat	2.7	1	1	3	1	/	/	/	1	1	/	1	1
	Cream, yoghurt	conductive	1	1	1	1	/	/	/	1	1	/	1	1
	Milk	conductive	1	1	1	1	/	/	/	1	/	/	1	1
	Sugar syrup	conductive	1	1	3	3	/	/	/	1	/	/	2	1
	Margarine	2.8-3.2	1	1	1	1	/	/	/	1	/	/	1	1
	Confectionary coating pastes, honey, jam, marmalade, liquid chocolate	2.4; 24; ∞; 3	1	1	/	1	/	/	/	1	/	/	3	1
	Edible oil	3.9	1	1	1	1	/	3	1	1	1	1	1	1
	Fruit juice	conductive	1	1	1	1	/	/	3	1	3	3	1	1
	Wine	conductive	1	1	1	1	/	3	1	1	1	1	1	1

SELECTION CHART FOR LEVEL TRANSMITTERS AND LEVEL SWITCHES

For Solids			Continous Level Measurement			Point Level Detection			
INDUSTRY	Medium to be measured	Relative Dielectric Constant (ε_r)	MicroTREK	NIVOCAP	EasyTREK EchoTREK	NIVOSWITCH	NIVOCONT R	NIVOROTA	NIVOCAP CK
Agriculture	Corn, cereals, grain, sunflower seed	2.0-5.0	1	/	3	3	1	1	1
	Seed-corn, granulated fodder mixture	2.0-3.0	1	/	3	3	3	1	1
	Granule fertilizers (Nitrates, Phosphates)	1.6-6.4	1	/	1	3	1	1	1
Con-struction Materials	Cement	1.5-10	1	/	3	3	1	1	1
	Ground, stone, sand, gravel	2.5-5.0	3	/	3	3	3	1	3
	Powdered lime (CaO)	1.6-2.2	1	/	3	1	1	1	1
Chemical Industry	Sodium carbonate, Soda (Na2CO3)	5.3-8.4	1	/	1	1	1	1	1
	Sodium bicarbonate, Baking soda (NaHCO3)	5.7	1	/	1	1	1	1	1
	Sodium hydroxide (NaOH)	conductive	1	/	1	3	1	1	1
Food and Beverage	Malt (dry)	2.2-3.0	1	3	1	1	1	1	1
	Lumpy fruit or vegetable	conductive	1	1	1	3	1	1	1
	Powdered milk	1.6-2.2	1	1	1	1	1	1	1
	Flour	2.4	1	1	1	1	1	1	1
	Grain	2.3-4.4	1	/	1	1	1	1	1
	Powdered sugar	1.8	1	1	1	1	1	1	1
	Granulated sugar	2.1-2.28	1	1	1	1	1	1	1
	Potato (whole)	conductive	/	/	1	/	1	1	3
	Sodium chloride (NaCl), Table salt, rock-salt	3.3	1	3	1	1	1	1	1
Mine	Coal, coal powder, metal ore, ground stone, gravel, sand	2.3-15	1	3	1	3	1	1	1
Power Plants	Coal dust	2.3	1	3	1	1	1	1	1
	Fly ash	1.5-3.3	/	/	3	/	3	/	1
	Carbon black	1.5-3.0	3	/	/	1	1	/	1
Paper Mill	Wood chips, saw dust (wet)	2.0-2.6	1	/	1	1	1	1	1
Recycling	Municipal waste, debris, household trash in silos	conductive	1	/	3	/	1	1	1
Plastic Industry	Granulated plastic	1.1-2.8	3	/	3	1	3	1	1
	Polyvinyl chloride (PVC)	3.4	1	3	1	1	1	1	1
	Polyethylene pellett	1.5-1.8	/	/	3	1	1	1	1
	Polystyrene	2.2-2.6	/	/	3	1	1	1	1

WIDE APPLICATION POSSIBILITIES IN VARIOUS INDUSTRY SEGMENTS

WATER & WASTEWATER

More than 900 000 level instruments were sold all over the world by **NIVELCO Process Control Co.** over the last 35 years.
NIVELCO is present in practically all industries with clear focuses provided by the features of the measuring technologies in its portfolio. Our intent with publishing this Application Handbook was to share a small part of our vast set of experiences with the Reader and aid our present and future clients in the selection of our instruments. When browsing this book the Reader is to be aware of **NIVELCO's** unique 5 year warranty (valid from 2018) policy which was made feasible to be introduced by the fact that our instruments are operating reliably most of the times even in extremely harsh environments in a great number of technologies of the industries we are serving. Almost no matter what level you need to measure – whether it is sewage in the USA, plastic granules in Hungary, chocolate in India or Sulphuric Acid in the Czech Republic – trust **NIVELCO** instruments to do the job.

FOOD & BEVERAGES

CONSTRUCTION MATERIALS

CHEMICAL & PHARMACEUTICAL

PETROCHEMICAL

AGGREGATES & MINING

ENERGY PRODUCTION

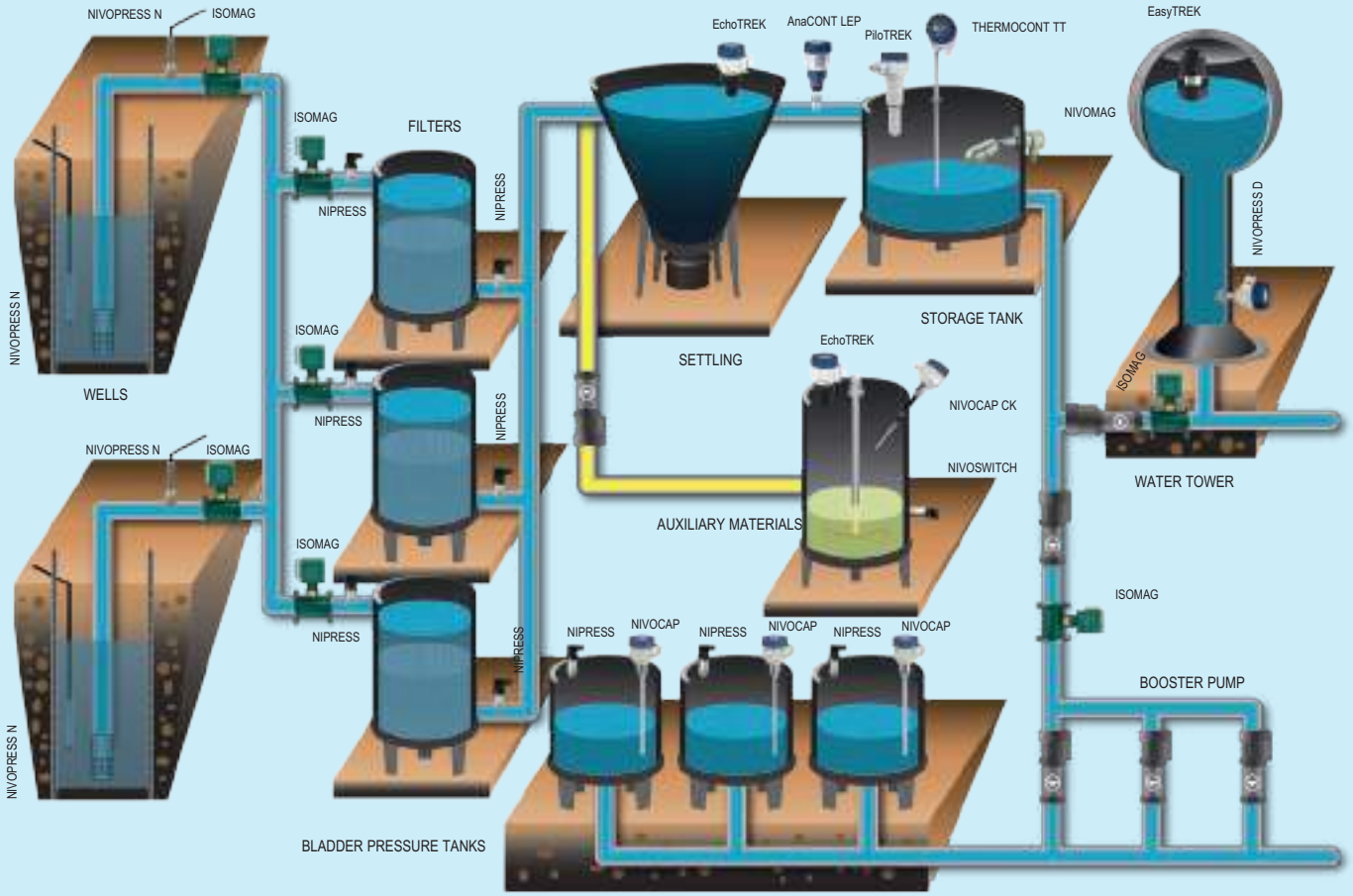
PLASTIC INDUSTRY

METALLURGY

MECHANICAL ENGINEERING

REFERENCES ON 5 CONTINENTS

WATER PRODUCTION



THE PROCESS OF WATER PRODUCTION CAN BE DIVIDED INTO 3 MAJOR PARTS:

- production wells
- water treatment
- water distribution system

PRODUCTION WELLS

The production wells can be found in ground layers rich in water, the pumps lowered into wells pump the raw water to the central water treatment facilities.

MEASURING TASKS:

- continuous level measurement of the well
- temperature measurement of the water
- hydrostatic pressure of the production well
- yield of the produced water
- draw-down protection of the well

SUGGESTED INSTRUMENTS:

- analogue level measurement with hydrostatic level transmitters that measure the water temperature beside the level: **NIVOPRESS NPK-400** transmitter family
- analogue pressure measurement with piezoresistive pressure transmitters: **NIVOPRESS NZK-400** types

WATER TREATMENT

- The raw water coming from the production wells contains different organic and non-organic materials. These materials have to be cleaned from the water. Cleaning is done either by mechanical filters or by adding coagulant materials to the water which reduce the contaminating materials. The resulting slurry is separated in settling basins.

Pressure measurement with **NIPRESS DRC-300** pressure transmitters, level measurement with **EchoTREK STA-300** ultrasonic level transmitters

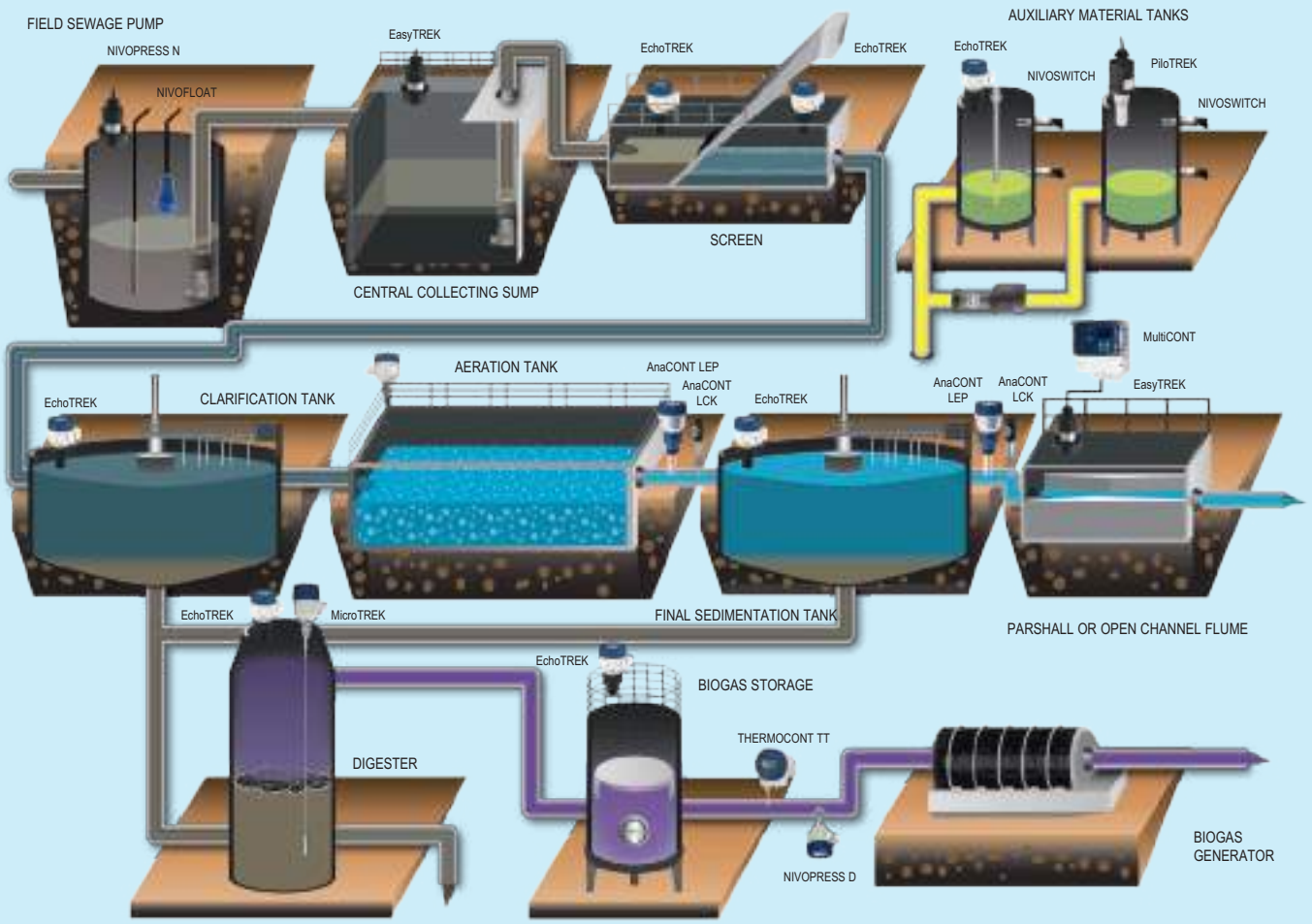
- pH measurement of the clean water with **AnaCONT** analytical instruments
- low/high level switching with **NIVOSWITCH** or **NIVOMAG** level switches

WATER DISTRIBUTION SYSTEM:

- pressure control at the compressed-air pumps with **NIPRESS** pressure transmitters and **UNICONT PMM-300** controllers
- water level control at the compressed-air pumps with **NIVOCAP** level transmitters and **UNICONT PMM-300** controllers
- water level measurement in the water tower with **EasyTREK** ultrasonic level transmitters or borehole transmitters

SEWAGE TREATMENT PLANT

INSTRUMENTATION CHART



FIELD SEWAGE PUMPS

The sewage is collected in underground wells and is transmitted to the sewage treatment plant with the help of the pumps.

MEASURING AND CONTROL TASKS

Very reliable analogue level measurement is necessary to control the starting and stopping of pumps. Fail safe switching points to avoid the dry run of the pumps.

RECOMMENDED INSTRUMENTS

The **EasyTREK SPA-300** type non contact ultrasonic level transmitter models with IP68 ingress protection are the most reliable devices for this measurement task.

Another popular choice is the flush mounted **NCK-200** type hydrostatic borehole transmitter as well as the **NPK-400** series with internal membrane and a sewage adapter working on the principal of the diving bell. A **PLC** or an **UNICONT PMM-314** is an ideal device to process the analogue signal and control the switching points. For fail-safe protection the robust **NIVOFLOAT NWP-100** float level switches are recommended.

CENTRAL SEWAGE TREATMENT FACILITY, WATER TREATMENT PROCESS

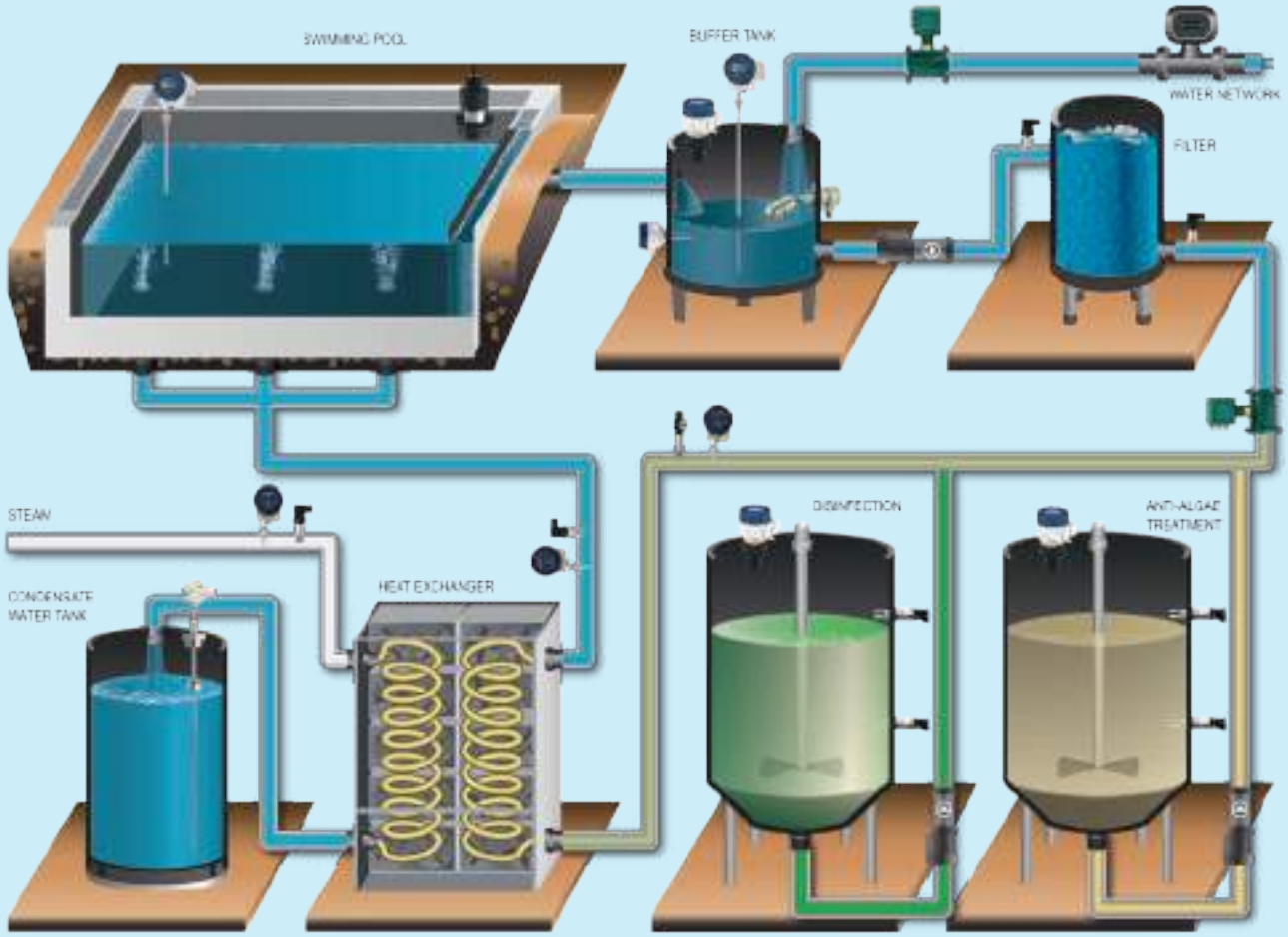
The sewage coming from the field pumps contains a lot of organic and non-organic materials in solid form as well as in the form of solvents. The solid particles are filtered with a mechanical screen. The purified sewage can be streamed to any natural water after chemical inspection and yield measurement.

- Ultrasonic transmitters for level measurements
- For the control of the mechanical screen a system with two ultrasonic level transmitters and a dual channel **PMM-323** is recommended.
- The **AnaCONT** analytical measurement devices are ideal for the chemical analysis of the cleaned water.
- The yield of the water output can be measured in a **NIVOSONAR GPA** Parshall flume

CENTRAL SEWAGE TREATMENT FACILITY, SLURRY TREATMENT PROCESS

ATEX certified ultrasonic level transmitters (**EchoTREK**/**EasyTREK**) and ATEX certified temperature transmitter for measuring the temp. of biogas, **THERMOCONT TTJ-500 Ex**.

SWIMMING POOL CIRCULATION SYSTEM



The overflowing water from the swimming pool is transferred by gravitational method and collected in a buffer tank. From this buffer tank the water is pumped through filters and then through a heat exchanger before the water returns to the swimming pool. The amount of the re-circulated water is continuously determined in accordance to the daily requirements and the number of hourly rotations can be set by a frequency converter. The amount of the circulating water determines operation times of the anti-algae dosing pump and the disinfection dosing pumps. The most important aspect in order to protect the heat exchanger is the upper temperature limit of the supplied water which should not be warmer than +38 °C (100 °F).

RECOMMENDED INSTRUMENTS

SWIMMING POOL

- Continuous level measurement: **EasyTREK SPA-360-4** ultrasonic level transmitter
- Continuous temperature measurement: **THERMOCONT TTC-528-4** transmitter

BUFFER TANK

- Non-contact level measurement: **EchoTREK SEA-380-4** ultrasonic level transmitter
- Low level switching: **NIVOSWITCH RFM-501-0** vibrating fork
- Level controlling: **NIVOMAG MKA-220-3** magnetic coupling level switch
- Continuous temperature measurement: **THERMOCONT TTC-528-4** transmitter
-
- Filter / Heat exchanger
- **NIPRESS DRC-4A2-2** pressure transmitter is used to measure the pressure at the inlet and the outlet
- **UNICONT PMM-321** universal controller calculates a differential between the pressure values and when it's above a specified value than a warning signal is released for cleaning the filter; other units are indicating the temperature or providing a control signal at the primary side of the heat exchanger
- **THERMOCONT TBC-521-2** transmitter measures the temperature at the inlet and the outlet

NIVELCO INSTRUMENTS ON THE MILITARY BASE

The **Aqua Technology Group LLC** is an experienced representative of **NIVELCO USA LLC**, representing **NIVELCO** products in Ohio, Kentucky, Indiana and West Virginia. ATG has had a working relationship with ECCI-Afghanistan engineering company thanks to their experience with bulk fuel level transmitters. Due to this relationship they were contacted when one of their contacts had an urgent need for open channel flow measurement, because the contractor had neglected to include that equipment in the package. When ATG were contacted they were in the final stage of sign off and the construction almost finished. The instrumentation project's most interesting aspect for the American (and of course for the European) eyes was the installation place which is the 215th Camp of the ANA (Afghan National Army) at Shorabak city in Helmand Province, Afghanistan.

NIVELCO DURABILITY AND AQUA TECHNOLOGY GROUP'S RAPID RESPONSE PROGRAMMING SETUP

Of chief concern in this application was operational durability. The first challenge here was that the client had an existing Grundfos chemical feed setup that did not have any of the proper flow pacing equipment. While this application is fairly simple, the second challenge was that the technical team had already left the site and the project manager and locals were all that was left to install the level measurement instruments.

The wastewater treatment plant is to be operated and maintained by Afghan National Army personnel, which means that the equipment has to be easy to operate and durable in a difficult environment. We discussed via Skype the situation and after several photographs of the location designed a simple solution using an analog to pulse controller that we could acquire locally and integrate with **NIVELCO's MultiCONT** controller and **EasyTREK** ultrasonic level transmitter we had in stock. **NIVELCO's EasyTREK** was selected due to the IP68 rated construction and long durability in many other field installations that Aqua Technology Group has completed over the years.

OPEN CHANNEL FLOW MEASUREMENT WITH ULTRASONIC LEVEL TRANSMITTER

NIVELCO representative **Aqua Technology Group** provided a new ultrasonic flow meter and level measurement solution using the durable **EasyTREK SPA-39N-4** type ultrasonic level transmitters with the **MultiCONT PRD-214-1** universal display and controller. The system was pre-setup, wired and calibrated to read the flow across the weir and utilized the additional output of the **MultiCONT** to flow pace chemical injection at the final contact chamber with a pulse converter they provided to match the existing chemical injection pump.

DURABILITY AND RAPID RESPONSE

While the equipment was being assembled, ATG sent the instruction manuals to a translator so that the local operational staff would have complete documentation in their native language, took final measurements and fabricated a mounting bracket that would meet

the installation needs. ATG then assembled, programmed and tested the units, boxed as a single shipment and arranged for drop off at the closest AFB for delivery. The flight occurred the next day and by the end of the week, the unit was installed and fully operational, with local sign off happening just a day after installation.
Because Aqua Technology Group kept stock of a **MultiCONT** and **EasyTREK**, they were able to work with the project manager to provide detailed installation drawings and overnighted the equipment to the base, instead of the typical 6 weeks. This meant the greatest success, since the project manager was able to come back home that same week.

Count on **NIVELCO** and **Aqua Technology Group LLC** to provide a durable and time sensitive solution for all your flow meter and challenging wastewater applications.

Dave Miller – Managing Director – NIVELCO USA LLC

NIVELCO INSTRUMENTS IN VIENNA'S SEWER SYSTEM

NIVELCO and our company in Austria have been partners and selling **NIVELCO** instruments since 1995. This close cooperation between the two companies was reborn in 2007 under the banner of Göth Solutions GmbH. Since that date this relationship with **NIVELCO** has been better than ever, which has enabled us to keep up with our major competitors.

In 2010, after much discussion a great wastewater treatment project came out to tender. We did not hesitate, and won the instrumentation project for **NIVELCO**. Many years ago, in 1997–98, we delivered several devices to the sewage works in Vienna, but after the successful trial period, we were crowded out by E+H or NIVUS products, despite our competitive prices. However, the new VEXAT regulations involving the pumping stations for sewage works fortunately brought **NIVELCO** back into contention.

These sewage shafts became classified as potentially hazardous Ex Zones, so replacement of all the instruments became necessary. Thanks to two years of negotiation and numerous product demonstrations, **NIVELCO's MultiCONT** process controllers were installed to monitor the level of liquids in Vienna's sewer system. This system is famous for its starring role in 'The Third Man' film.

THE INSTRUMENTATION TENDER DEMANDED MANY REQUIREMENTS:

- Universal control units with up to 8 relay outputs in contrast to the old ones with only 1 – 2 relays
- Minimal necessity for replacement components
- IP68 rated sensors
- Transmitters with up to 100 m (330 ft) cable length
- Easily expandable relay outputs
- Replacement units free of charge in case of service
- Provision of on-site technical support

According to the preliminary surveys and the test operations, the **MultiCONT PRC-220-6 Ex** type multichannel process controller was installed and expanded with **UNICONT PJK-102-4** and **PJK-120-4** universal interface modules. Level measurement is done by **EasyTREK SPA-380-8 Ex** type integrated ultrasonic transmitters with 50 m (165 ft) and 100 m (330 ft) cable lengths.

The previously used E+H and NIVUS equipments were replaced with the **MultiCONT** controller system thanks to its flexibility because it is easily expandable with **UNICONT PJK** relay and current output modules. Moreover the possible troubleshooting became easier and more cost-effective. With **NIVELCO's** solution the number of the installed devices could be reduced to only 5.

Two meters (6 ft) under the famous Karlsplatz of Vienna, an instrument rack hides a **MultiCONT** unit. The location is at the other side of the square's famous tourist sightseeing point, given the name 'The Third Man'. The entrance to the drain system and the **MultiCONT** units is

only 60 cm (2 ft) wide. The ultrasonic transmitters with their 50 m (165 ft) and 100 m (330 ft) cable lengths provide a reliable source of information for the controller about the level in Vienna's sewer system. Shortly after the instruments were put into operation, some failures had been detected in the HART® communications link between the transmitters and **MultiCONT**.

Göth Solutions made an immediate on-site diagnosis and replaced the **MultiCONT PRC-220-5 Ex** process controller with another similar model, powered by 230 V AC. We also examined the electrical system, but did not find any abnormality which could have resulted in this kind of communication problem.

With our many years of experience of industrial measurement technology we were able to realise the source of the problem. The electrical system in the Viennese underground was producing interference in the HART® communications. The solution was to replace the **MultiCONT** with a galvanically isolated 24 V DC model. With this **MultiCONT PRC-220-6 Ex** model the HART® communication has become reliable, and not shown any further problems.

Summarising this successful project, we have to be aware of the environment in a metropolis like Vienna, and we have to consider that reliable HART® communication near a high current underground system can be performed only with galvanically isolated units. We are proud that co-operating and using our professional knowledge, coupled with high-quality **NIVELCO** products enabled us to achieve such success as in Vienna's sewer system.

Harald Göth – CEO – Göth Solutions GmbH

IMPROVING THE WATER QUALITY IN THE WASTEWATER TREATMENT PLANT IN BILEĆA

BOSNIA

The Belgrade based INDAS software and engineering company and **NIVELCO** have been partners for over 15 years. During this long cooperation INDAS has instrumented many plants and factories with **NIVELCO** manufactured devices, especially in the field of water and wastewater treatment.
The excellent and reliable ultrasonic transmitters have been applied in the instrumentation project of the wastewater treatment plant in Bileća.

THE FOLLOWING NIVELCO MEASUREMENT INSTRUMENTATION IS USED IN THIS PLANT:

- **NIVOFLOAT NLN-120** float switches (3 units)
- **EasyTREK SCA-360-2** integrated ultrasonic transmitter (2 units)
- **EasyTREK SCB-360-2** integrated ultrasonic transmitter (9 units)
- **UNICONT PMM-312** universal controller (4 units)

This plant is controlled completely by three PLC and all measurement instruments are connected to the PLCs digital/analogue inputs.
In the applied wastewater treatment process the retention basin is equipped with an **EasyTREK SCB-360-2** ultrasonic level transmitter that has PVDF transducer. This is used for continuous measurement of water level and the measured value is shown on the SCADA application.
The bioreactor is a pool where the following cycles are present: mixing, aeration, inaction, clearing, settling and decantation of wastewater. This pool is never empty, and the water level is always maintained between the two border levels. These minimum and maximum levels in the bioreactors are measured with using two **EasyTREK SCA-360-2** ultrasonic level transmitters with PP transducer.
In the tertiary treatment the wastewater retention basin accepts water from the bioreactor and forwards it to the gravity filters. This pool is also equipped with **EasyTREK SCB-360-2** level transmitter besides two valves which drain the water to the gravity filters. On the gravity filters there are two **EasyTREK SCB-360-2** ultrasonic level transmitters. The measured values are displayed on a **UNICONT PMM-300** universal controller and the SCADA application.

The operator launches the process of washing the filter and it takes place in the following three stages: washing with air, washing with water and air and washing with water. At the stage of washing the filter with water, pumps take water from the filtered water pool. This pool with filtered water is equipped also with an **EasyTREK SCB-360-2** level transmitter and the measured value is displayed on the SCADA application and **UNICONT PMM-300** universal controller. From the same pool, the filtered water is discharged into Lake Bilećko.

According to the demands of the technology the thickened sludge from the bioreactor is periodically transported by sludge pumps into the pool for homogenization of sludge. The sludge is homogenized using mixers. Homogenization basin, the sludge pumping station as well as the basin for reception of concentrated sludge is equipped with **EasyTREK SCB-360-2** integrated ultrasonic level transmitters.

The concentrated sludge is then transferred to a compactor where its dehydration takes place. Excess water is returned to the purification process, while the sludge is taken to the landfills.
Measurement data of all EasyTREK transmitters are displayed on the SCADA application. Dry-run protection of the pumps is provided by **NIVOFLOAT NLN-120** level switches. Implementation of this project has achieved excellent quality of treated water which has reduced pollution of Lake Bileća.
Thanks to this water quality improvement, all users who are supplied from the lake can get cleaner and healthier water also in the downstream cities such as Trebišnjica, Trebinje, and Dubrovnik or Herceg Novi.

Majda Trnjakov – Sales Engineer – INDAS d.o.o.

USING GREEN ENERGY IN THE WATER TREATMENT PROCESS

BRASIL

The Brazilian **NIVETEC Instrumentação e Controle** is the most successful distributor of **NIVELCO** for many years. In 2014 people from all over the world focus on Brazil not only for the FIFA World Cup, but also for the upcoming Olympic Games held in 2016. This way it is not a big surprise that the number of infrastructure investments just growing and growing throughout the country. One example is the modernization of the wastewater treatment plant in São Paulo State, (the south-eastern part of the country) in Pinhalzinho city.
The instrumentation task was to provide automatic flow control system at the inlet and outlet of the sewage treatment plant allowing storage and collection of data with notebook. In accordance to the customer requirements the system should use 'green' power, without producing waste of any kind and therefore not polluting or assaulting the nature meeting the Environmental Management Policy of SABESP.

MAIN FEATURES OF THE REALIZED MEASUREMENT SYSTEM:

- Security against vandalism
- Specifying the most suitable channel for the accuracy required
- Autonomous Power System
- Flow Measurement System with Data-Logger
- Low cost solution and maintenance
- Possibility of expanding the measurement system with more instruments and integrating into a process control system

Two **EchoTREK SGP-380-3** type 2-wire ultrasonic level transmitters – featuring logging capability – are parameterized to perform open channel flow measurement.

Both units measure the instantaneous flow rates and also the total flow values, one with the help of a Parshall flume at the inlet side and one with the help of a V-notch weir at the outlet side.

The Parshall flume at the inlet side of the wastewater treatment plant is surrounded by a small 3 meter (10 feet) high brick house with the area of 3 x 2 m (10 x 6.5 ft). On the top of the building there is a solar panel with orientation to the north at the optimal 23° angle providing the required 'green' energy for the measurement equipment.
At the outlet side there is an outside V-notch weir made from concrete which is surrounded by high metal railings.

The installed ultrasonic level transmitter also comes with a solar panel, which is also installed on top of a small brick building, hiding the electronics for the solar panels.

Herasmo Marques – Sales Engineer
– NIVETEC Instrumentação e Controle Ltda.

NIVELCO ANALYTICAL INSTRUMENTS IN WATER TREATMENT

FRANCE

C2Plus was established in 2010 in Saint Laurent Blangy, located near Arras in the north of France. As the director of this company I have many years of experience in the field of process control, acquired in world-class leading companies of this area.
I joined ABB in 1997 for 5 years as a technical and commercial assistant, and then Mobrey for 7 years as a sales engineer. C2Plus is an expert instrumentation company, targeted at the design and specification of a project until its completion. We always highlight the best quality solutions as our main focus, so **NIVELCO** products and the 'know-how' of C2Plus create an excellent team.
The quality and reliability of the **NIVELCO** instruments, and especially the flexible manufacturing capability for unique product versions mean that we can offer a suitable solution to satisfy most customised applications. This is really advantageous in the area of industrial process automation, including the water & wastewater segment, a market of particular interest for C2Plus.
We received an enquiry requiring liquid analytical transmitters for a water quality control process. Our customer wanted to optimize the aeration process, which was controlled with simple cyclic timers.
Independently from the Redox-potential and the dissolved oxygen values the aeration turbines started each hour and worked for 15 minutes.
It is obvious that this solution requires a remarkable amount of energy and costs a great deal of money.
We proposed **NIVELCO**'s **AnaCONT** water-analytical transmitters to provide a solution for control of the aeration process, based on actual DO and ORP values.
Therefore the aeration starts only if it is necessary, and lasts only until the water quality recovers to the required state. So **AnaCONT LGR-100 ORP** & **AnaCONT LGD-100** DO transmitters with graphic

display and tube extended probe were installed in the water containing pools. Each transmitter communicates with **MultiCONT** process controllers using the HART® protocol. The **MultiCONT PEW-229-1** displays the measurement data of the ORP transmitter, and a **MultiCONT PEW-226-1** displays DO values and temperature data from the DO transmitter.

Now the aeration process is controlled directly by the relay outputs of the **MultiCONT** units. When the Redox potential value reaches the preset low value, the turbines start to work.
The turbines stop when dissolved oxygen value exceeds the optimal high level.

The most advantageous feature of the system is that the control process is dependent on both the DO and the ORP values.
Our customer was able to realise a significant increase of efficiency thanks to this instrumentation investment. The considerable cost savings resulting from the lower energy consumed produced a payback for the instrumentation project within a few months. Therefore our customer satisfaction was extremely high, just like the reliability of the measurement system.

Christophe Carreira – CEO – C2Plus

NIVELCO INSTRUMENTS POWERED BY SOLAR PANEL

FRANCE

The European Union regulations impose the users to measure the volume of wastewater crossed in natural area. This has high importance in case of a heavy thunderstorm when the water level in the drainage channels increase significantly and there is a risk of overflow. Most of the time, the less expansive possibility is to measure the overflow with an open channel flow metering system including an ultrasonic transmitter.

Veolia Eau – who provides delegated management of water and wastewater services for municipal and industrial clients – applied an **EasyTREK** ultrasonic level transmitter together with a **MultiCONT** controller in the water monitoring system. The **EasyTREK SPA-380-4** integrated ultrasonic level transmitter measures the level in the drainage channel and transmits the measurement data to the **MultiCONT PEW-216-2** process controller.

A linearization table with 20 points is programmed in the **MultiCONT** to convert level value to flow with the help of Manning Strickler Formula (relation between level and flow in a circular pipe).

The 4 – 20 mA output and pulse relay are wired to a small GSM transmitter (RTU – Remote Terminal Unit) which sends the measured flow data to the central computer system. The most interesting part of this smart measurement system is not only the wireless data transmission, but the powering. The DC powered **MultiCONT** process controller and the connected GSM transmitter unit are powered by battery reloaded by a solar panel. The solar panel continuously charges the battery pack and it provides 12 V DC power supply for all the devices placed in the instrument rack.

The commissioned measurement system resulted remarkable energy and cost savings compared to the standard 230 V network operated systems.

During the 10-month test operation there was not raised a single objection to the reliability of the measurement system.

This successful project is again a very good example showing that the expertise of C2Plus and the excellent instruments of **NIVELCO** complementing each other and creating efficient instrumentation solutions.

Christophe Carreira – CEO – C2Plus

THE BUILDING AUTOMATION SYSTEM OF THE ZALAKAROS THERMAL SPA

HUNGARY

THE GOALS TO BE IMPLEMENTED WITH THE BUILDING MANAGEMENT SYSTEM

With the help of the BMS (Building Management System) we provided suitable solution for the following requirements:

- Measurement, optimization and automation of the buildings' energy consumption (for example time programming, which makes possible to reduce more energy consumption of the heating / cooling / ventilation at night; reduces the wear and maintenance needs of the heating / cooling / ventilation systems; maximization of the energy consumption upon the contracted volume of the electricity)
- Measurement, optimization and automation of the produced water of the wells
- Measurement, data logging and control of the temperature of the water in the pools
- Measurement, optimization and automation of the chemical level in the pools
- Measurement, optimization and central automation of the aeration and ventilation (for example air replacement depending on the humidity and the carbon dioxide content, providing pleasant environment, energy-saving operation; designing the possibility of cooperation between the systems)
- Monitoring the proper operation of the building, wells and mechanical elements; reducing the time spent on maintenance
- Providing remote diagnostics and the possibility of remote intervention
- Sending warning messages immediately when any equipment become defective

- Continuous control of the inspection tour made by the personnel
- Continuous data logging of the energy consumption, and events history about the operation of all equipment / mechanical items

THE BMS IS ABLE TO COLLECT AND EVALUATE THE DATA OF THE FOLLOWING SYSTEMS:

- Electrical power system
- HVAC system
- Security and safety system
- Fire protection system
- Closed circuit camera system

With the efficient usage of the Building Management System the more and more comfortable and economical operation of the buildings, wells, tanks and any other equipment are guaranteed. In the first phase the goal focused on the evaluation of the collected data. The implementation of the central process automation will be done in the second (or later) phase.

SHORT DESCRIPTION OF THE BMS'S SUBSYSTEMS AND THEIR ELEMENTS

The system consists of several levels. The data transmission devices are located in the lowest level, then the infrastructure tools level comes, and finally the central system performing the management is on the top.

DATA ACQUISITION DEVICES OF HYDRAULIC ENGINEERING SYSTEM AND SWIMMING POOL TECHNOLOGY

Hydraulic engineering system is divided into two sectors: one is the water production at the wells and the other one is at the pools where the utilization of water takes place. Both pipe-systems, the water production and water consumption sides are needed to be equipped with sensors. The measurement signals are connected to ADAM modules through cables.

These modules provide compatibility with the building management system. The system components belonging to the water pools are connected through cables, the only exceptions are two groups of wells where the signal is transmitted by FM antennas. The pools are organized in chain and connected to the control room. In case of the wells it is important to collect the data directly at the first few pipe sections of the water production to get information immediately in case of any changes. It's also important to place the sensors at the ending pipe sections near pools in order to measure the same values as of the pool.

In case of water production the three most important factors are the produced water volume, the water temperature and the pressure of the thermal well-head which have to be continuously measured. In addition to the water temperature it is necessary to monitor the parameters and the proper amount of disinfectants used in the actual chemical treatment process at the pools.

THE BUILDING AUTOMATION SYSTEM OF THE ZALAKAROS THERMAL SPA

HUNGARY

The equipments responsible for the monitoring of the parameters required for the automatic pool filling (such as water volume at the filling and empting pipe) will be installed during the construction in the second phase. The automatic chemical dosage of the pools has already solved because the water circulation system is already using this function. We had to integrate this chemical dosing system into the central control system in order to have central access and able to send notifications immediate if any changes occurred of if any intervention is necessary.

HVAC SYSTEM

The existing boilers, air handling units and liquid coolers can establish connection to the central computer by DDC (Direct Digital Control) controllers. This case there is no need to install a digital module, because these devices are already support digital communication as the necessary drivers are installed to the central computer. The air temperature in the halls is measured by separate devices as well as digital field displays are also provided which are located near the pools.

POWER CONSUMPTION

The power consumption is also monitored by the central supervisory software. Separate modules which are authorised by the service providers have been installed to the electricity feeding points and to the central gas-meter. The current consumption data is recorded by the central computer for making trends which can be used to determine the contracted amount of these services more precisely.

THE BUILDING AUTOMATION SYSTEM OF THE ZALAKAROS THERMAL SPA

HUNGARY

INFRASTRUCTURE

The devices collecting any kinds of parameters are connected by wires and in some cases there are wireless connections. Since the length of the cable network can be measured in several hundreds of meters (few thousand feet) for each division it was necessary to install junction boxes into every section. Thinking about the future improvements we had to install spare wires for the further units to be installed soon.

MONITORING SOFTWARE

A very important aspect of choosing the central software was that it has to illustrate the changes immediately so only graphical software is suitable for this task. After the long lasting selection process the **NIVISION** process visualization software was selected for this purpose. All the measurement data is recorded into a database located on the central server. This provides possibility to view what happened in any areas of the spa retrospectively from the start of the system at any given moment.

VISUALIZATION

The visualization took place in several monitors. A large central monitor with ~160 cm (63") screen size displays the complete thermal spa and the corresponding system components and two smaller monitors with ~85 cm (32") size displays the operation of the water production wells and all their data. In addition there is another monitor where any of the system components can be visualized individually and examined one by one and the settings of the software can be changed if necessary.

SUMMARY ABOUT THE INSTALLED SYSTEM COMPONENTS:

- **THERMOCONT TTC-520** type temperature transmitters, many types of the **EasyTREK SPA-300** ultrasonic level transmitter family, **NIVOPRESS D-500** hydrostatic level transmitters, **NIPRESS D-400** pressure transmitters and **ISOIL ISOMAG** electromagnetic flowmeters.
- Motorized valves, magnet switches, inverters
- Digital and analogue DDC regulators
- GSM modem, UHF antennas and digital routers and data transmission devices
- Central computer running **NIVISION** process visualization software with on-line connection

The experts of **NIVELCO** have been involved in the set-up of the monitoring system, the design of the visualization and the customization of **NIVISION** software.

OPERATOR EXPERIENCES

The reliable level control of the buffer pools and the time control of the already existing water re-circulating systems resulted that the energy savings of the thermal spa exceeds 50% since the installation of the system.

Ákos Noll – Domestic Sales Engineer – NIVELCO CO.

LEVEL MEASUREMENT IN OPEN RESERVOIRS WITH NIVOPRESS N

INDIA

In today's world water is a very precious substance as the water resources on Earth are reducing drastically.
This is well understood in industry all over the world and leads to the necessity of accurate measurement of water levels. This is especially true for measurements in open reservoirs, and the importance of automation is increasing significantly in the Indian water industry.
In the past, here in India, mechanical float operated level instruments were used, like 'Float & Board' or 'Float & Tape' type level gauges, etc. Due to practical limitations in the installations, these can be provided up to 3 to 5 meter (10 to 16.5 feet) of range and have considerable problems when the floats become stuck, caused by objects flowing with the water – like pieces of cloth/paper which can be present in raw water reservoirs.
Level measurement systems using general pressure or a differential pressure transmitter is not normally possible in practice, in open reservoirs like dams, lakes, rivers, ponds, fore-bays, bore-wells, sumps or under-ground reservoirs. For automation a continuous signal is preferred and hence people started to use low cost capacitance level transmitters for these applications. Unfortunately there are practical difficulties for bigger reservoirs in the calibration of such instruments.
Also these types of transmitters are not suitable for use in bore wells because they do not provide good practical accuracy.
The ultrasonic level transmitters like our **EasyTREK** and **EchoTREK** instruments are very popular nowadays in the water industry due to the non-contact measurement method and easy installation. For open reservoirs these transmitters have limited use as there can be very strong wind effects which divert the ultrasound waves, resulting in undetectable echoes. This problem is greater when the range to be measured is much more andthe transmitter is installed in an extremely open location. The use of radar / microwave level transmitters is increasing now in the water industry, because with no moving parts, non-contact sensors, good accuracy and easy installation.

But in India the difficulty for the user is the high cost for non-contact radars and the non-availability of proper trained manpower at the remote installation sites like dams and rivers. Providing such manpower calls for considerable investment. In India we have had several enquiries from some of our clients like Andhra Pradesh State Electricity Board (APSEB), VA-TECH WABAG, etc., for non-contact radars for 70 and 100 meter (230 and 330 feet) ranges. They found the cost of the instruments for water applications too high, and the well-trained man power for installation and maintenance of such high-tech instruments was not available from the client. Another solution was needed.

Measurement arrangement under testing at India

Consequently the **NIVELCO India** sales team offered **NIVOPRESS N** insertion type hydrostatic level transmitters as the best option for an affordable solution for such open reservoir applications, such as in the Red Sea coast at Aden city in Yemen. These transmitters are very effective as they are available for up to 200 meter (656 feet) range. The special models are popular instruments of the water/wastewater industry and provide excellent alternatives for ultrasonic transmitters where ultrasonics are not suitable, for example for open sea water applications. Special adaptors are also available for protecting the sensor from muddy water, and its installation is very easy as they are pre-calibrated. HART® capable versions can be remotely programmed via standard HART® communications. Still there were a few hurdles to be challenged successfully by the team of **NIVELCO India**.

For the longer range devices with more than 10 meter (33 feet) of cable length in open reservoirs, the sensor movement can be like a pendulum, and the sensor can possibly getting stuck or snapped.
This may require proper counter weight/fixing to restrict such movement, like the **NMW-100** counterweights of **NIVOFLOAT NL** float switches.
In the case of reservoirs like dams, rivers, ponds etc. there is the possibility that big pieces of cloth, paper etc can get wrapped around the sensor, (even though it is provided with special adaptors) leading to malfunction.
So we decided to overcome such problems by using a fabricated cage along with stainless steel multi strand wire ropes.

Here the cage acts like a good counter weight and the wire rope takes the entire weight avoiding any weight on the instrument's integral cable. The cage also works effectively to fend off floating objects.
With such additional accessories we have provided our **NIVOPRESS NPK** hydrostatic level transmitters that were able to meet all the requirements of our customer and the measurement circumstances.

VA-TECH WABAG also requested a remote display of the level transmitter information. This task was solved by using **MultiCONT** multichannel process controllers installed in the control room. Intrinsically safe (Ex ia) type **NIVOPRESS NPK-541-5 Ex** trans-mitters with piezo sensor, HART® communication and 5 meter (16.5 feet) cable length along with **MultiCONT PEW-215-6 Ex** process controllers are performing their borehole measurement duties very well, to the great satisfaction of the customer.

Shrikrishna N. Deshpande – CEO – NIVELCO Instruments India Pvt. Ltd.

ULTRASONIC FLOW MEASUREMENT IN TROUT FARMING

Trout farming looks back to a history of one hundred years in Romania and nowadays became a dynamically developing industry. The growing demand of the hospitality industry or the hobby and sport fishing for this noble fish requires new farming technologies to apply. More and more contractors see beneficial opportunity in establishing trout farming fishponds thanks to the more efficient farming methods and the expanded professional background of this segment. In addition to this, European Union funds – nearly 230 million EUR – are available for the participants of trout farming sector.

The essential condition of the trout farming is the proper amount and quality water. The water supply system of the fishponds has to provide the refreshment of the water several times a day. The water should be pH 7 (neutral), or slightly alkaline, with low iron and min. 7 mg/l (7 ppm) oxygen concentration at 18 °C (64.5 °F) temperature.

Usage of modern measurement instruments is essential in order to monitor and control the operation parameters. In **NIVELCO**'s portfolio there are suitable pH, dissolved oxygen, temperature and ultrasonic flow transmitters.

Our customer, the ERHAL Kft. has more than 10 fishponds and in this first phase they asked for an offer on proper water flow measurement which meets the requirements of the Romanian Water Authority.

In accordance to the local environment we offered an open channel ultrasonic flow measurement solution. Since accurate information about the yield was not available, first we had to make proper measurements in order to select the suitable size **Parshall flume**. For this purpose we used a SEBA type hydrometer in the channel network which feeds the lake. Based on the results and the required water amount for trout farming we offered P5 size **Parshall flume** with **EasyTREK SPA-390-4** ultrasonic level transmitter and **MultiCONT PEW-210-1** process controller and display unit.

This flow-metering system with Parshall flume has the necessary certification for custody transfer measurements of the Romanian Metrology Authority.

After the first test phases many partner companies of our customer were interested about such a complete flow measurement solution for fishponds. In accordance to the yield (defined by the Authority) we offered similar solutions with great success, so **NIVELCO T.M.** counts with several fishpond instrumentation projects in the future.

Our customers are also interested in the expanding of the measuring system with further parameters to monitor such as pH, DO and temperature. For these tasks we can offer **AnaCONT** analytical transmitters and **THERMOCONT TT** temperature transmitters.

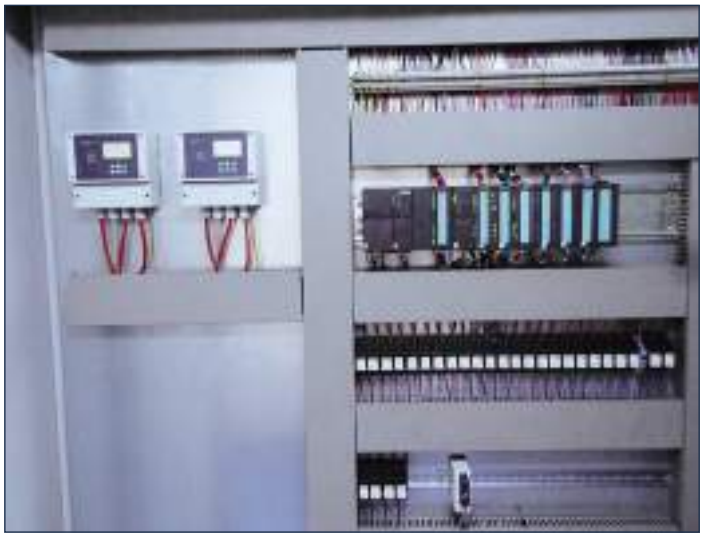
Antal Máthé – Technical Consultant – NIVELCO T.M. S.R.L.

NIVELCO DEVICES IN THE WWTP IN ROMANIA

WASTE WATER TREATMENT PLANT IN BORSZÉK TOWN

In the last 5 years in order to develop the environmental sector in Romania the ESOP (Environment Sector Operational Plan) provided around 4.5 billion EUR from the European Regional Development and the Cohesion Funds. The general objective of the plan is primarily to improve the citizens' standard of living, secondly to improve the compliance of the environmental regulations, and thirdly to accomplish the requirements of the EU accession commitments in terms of compliance with environmental laws.

The investments are focused for the enhancement of the water and wastewater network which is materialized in newly built waste water treatment plants and modernizations of the older facilities. The beneficiaries of the projects were the regional water companies. Realizing the great opportunity for the Romanian subsidiary of **NIVELCO** we took part in several modernization projects of small water treatment plants throughout Romania. The **NIVELCO** manufactured level switches, continuous level transmitters and the liquid analytical transmitters met all requirements of the instrumentation projects.



The small water treatment plant in Borszék town is one of the modernized facilities which has been equipped with the following **NIVELCO** devices:

- **EasyTREK SPA-380-4**
  integrated ultrasonic level transmitter (4 units)
- **MultiCONT PEW-215-1**
  multichannel process controller (2 units)
- **NIVOSONAR GPA-1P5-4**
  Parshall channel (2 flumes)
- **AnaCONT LGD-121-2**
  dissolved oxygen transmitter + extension accessories (2 units)
- **AnaCONT LGP-111-2**
  pH transmitter + extension accessories (1 unit)
- **MICROSONAR UTP-211-4**
  ultrasonic proximity transmitter (1 unit)
- **NIVOFLOAT NWP-110**
  float level switch (5 units)

The **MICROSONAR** ultrasonic proximity transmitter is equipped in the primary treatment process where the mechanical cleaning is done with sedimentation equipments such as screens, filtering the larger floating particles and separating the contaminations physically from the water.

The **AnaCONT** dissolved oxygen transmitters are used in the secondary, biologic treatment process where the organic materials are degraded anaerobically (without oxygen) by microorganisms. Here the **AnaCONT** transmitters measure the oxygen concentration and controls the air diffusers. Two pools of the biological treatment process are measured by IP68 rated EasyTREK integrated ultrasonic level transmitters.
The **AnaCONT** pH transmitter controls the chemical feed in the tertiary

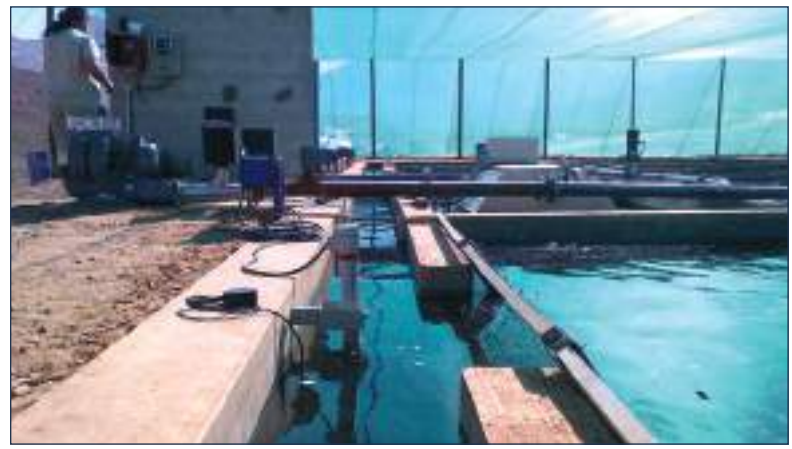
treatment process where the end-product of the biologic process, the inorganic materials (e.g., nitrates, phosphates) are removed. The inlet and outlet water is measured by an open channel yield monitoring system consisting of two **Parshall** flumes, two **EasyTREK** ultrasonic level transmitters and a **MultiCONT** multichannel process controller. The **NIVOFLOAT** float level switches are responsible for providing high alarm switching in all process steps. The instrumentation of the water treatment plant operates flawlessly for more then one year and the main contractor ordered recently more **NIVELCO** instruments for similar facilities.

Antal Máthé – Technical Consultant – NIVELCO T.M. S.R.L.

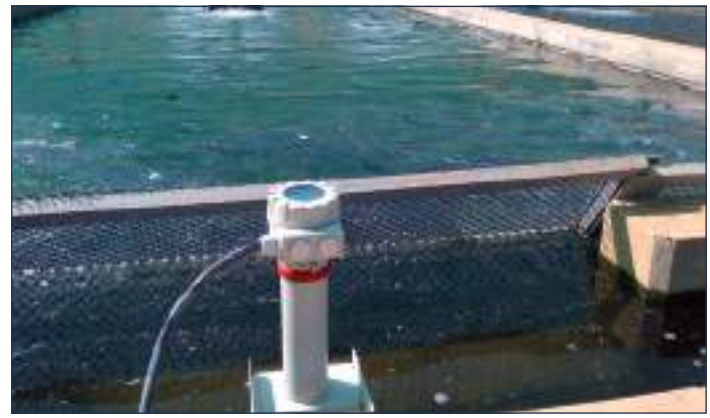
ANACONT DISSOLVED OXYGEN TRANSMITTERS PROTECTING THE RED GOLD

SOUTH AFRICA

The next member of our series – introducing **NIVELCO**'s distributors and their successful instrumentation projects – is the Flotron Instrumentation Services (Pty) Ltd established in 1990.
Thanks to *Flotron* in *South Africa* – which is famous for its diamond-mines and the vuvuzela from the FIFA World Cup 2010 – there are now several **NIVELCO** instruments operating.
Located in *Stellenbosch* – not far from *Cape Town* at the south-west corner of *Republic of South Africa* – our distributor is dealing mainly with level and flow measurement solutions for water and wastewater industry. In the African continent *Flotron* Instrumentation was the first who used **AnaCONT** liquid analytical transmitters for an instrumentation project started in 2011.
Their customer was Molapong aquaculture, (their name is a Sotho word for fresh water well) specialist of fish farming and the biggest producer of quality rainbow trout in *South Africa*. The trout are not only raised for their meat but primarily for their much more valuable reddish ova so-called red gold. Since the spawning-season of the fish is different depending geographical circumstances the Molapong aquaculture is in a fortunate situation to guarantee fresh red gold for the market when the *Northern Hemisphere* cannot.
Thanks to this favourable situation and the achieved growing market share there was a development project started last year to increase their ova production from 1 million to 10 million in a year. A trout usually become mature at the age of three so reaching the 10 million ova number can be considered as a 3-year investment. Loosing just only one fish is considered as a failure of the 3-year investment therefore it is important to provide suitable living environment for the fish to maximize the coveted red gold.
In framework of the instrumentation project a complex dissolved oxygen monitoring system for the fishpond was implemented based on **NIVELCO**'s **AnaCONT LED** dissolved oxygen transmitter. The transmitters are connected to **MultiCONT** process controller with HART® communication so the results of the measurements are not only followed with the local **SAP-300** display of the transmitter but from the remote control room.
The transmitter continuously measures the dissolved oxygen level of the fishpond and triggers an alarm when the level drops below the low alarm set point.



The Danish designed re-circulation plant is unique in this field in South Africa would operate even in a European country because it meets all European regulations to provide the required high quality of the produced ova to allow the export. Added to this, the secondary aerators – used in the system which is connected to the **AnaCONT** dissolved oxygen transmitter – are controlled in accordance to the measured DO values. According to the measurement results the aeration starts only if necessary and last only until the water quality recovers to the required state so the system enables significant energy savings.



Furthermore the new investment had a favourable effect on the reproduction efficiency.
The recirculation plant was presented on an agricultural TV programme and was set to be an example for other plants of its kind being planned in *South Africa*.
Thanks to *Flotron* Instrumentation hopefully they will also chose **NIVELCO** liquid analytical transmitters and a few years later there will be more red gold worldwide coming from *South Africa*.

Jacobus M. Vosloo – Managing Director – Flotron Instr. Services (Pty) Ltd.

WASTEWATER INSTALLATION IN EL PASO, USA

SUCCESS STORY WITH PILOTREK MODEL WPP RADAR

El Paso, Texas is a mid-size, *West Texas City* adjacent to the Mexican city of *Ciudad Juarez*. Their borders basically touch and are separated by fencing, wire, walls, canals, The Rio Grande River and other structures. El Paso itself is heavily influenced by Mexican heritage and many restaurants offer culture and cuisine from the Mexican State.

The lift station we visited was merely 25 feet from the border with rail tracks running from *El Paso* to *Ciudad Juarez* and vice versa. A large steel wall opens and closes to allow rail cars to pass to their destinations.

Wastewater lift stations and remote pumping stations are generally not really pleasant places to visit. The lift stations are noisy and

often inhabited by snakes and rodents. The lift station we visited was a locked fortress with iron gates and large padlocks to prevent unauthorized entry.

During heavy rains, especially in the winter months, large volumes of trash, consisting of cans, bottles, cups and paper waste are washed down the drains on streets and wind up in the lift station inlet well.

Electric Supply Source (ESS), working together with **NIVELCO**'s Representative, sought to provide a solution for continuous measurement of the level in the 30 ft deep well containing the storm water and trash.

A **NIVELCO** model **PiloTREK WPP** was selected. Full installation, transmitter configuration and start up were performed by highly trained ESS electricians. A six inch PVC plastic still well was available on which to mount the **PiloTREK** model **WPP** radar transmitter.

Several float type level switches are positioned along the still well to control the water level flowing into the well.

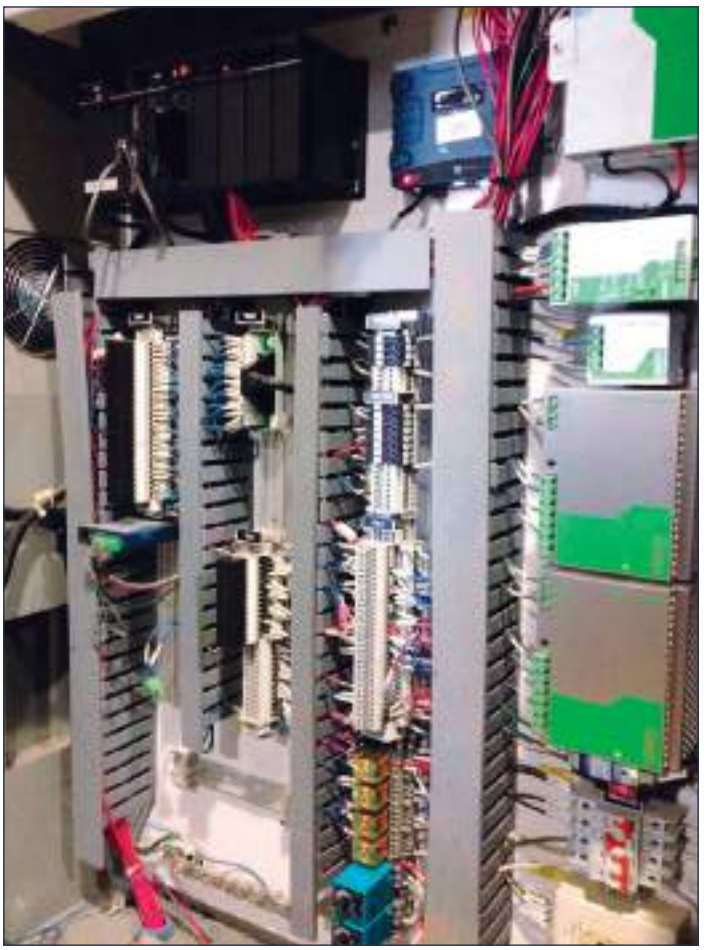
The plastic still well serves two purposes: it keeps the surface calm within it to enable measurement and keeps the floating trash out. It runs almost the entire depth of the well.

Since installation, the **PiloTREK** has performed flawlessly, operating continuously to provide level data in the well to a wall mounted data acquisition system.

Data is then transmitted wirelessly via a GE wireless Ethernet network to a central location to provide critical information to operators and engineers on capacity and needed pumping operations.

The ability to operate flawlessly and continuously in such adverse conditions is a testament to the quality of the **PiloTREK** and the *El Paso* Water District looks to install additional units at other locations in the near future.

Dave Miller – Managing Director – NIVELCO USA LLC



LIFTSTATION LEVEL MEASUREMENT IN OHIO

The Aqua Technology Group LLC is one of the most experienced representatives of the **NIVELCO USA LLC**, representing **NIVELCO** products in *Ohio, Kentucky, Indiana* and *West Virginia*. ATG is an *Ohio* based provider of meters, controls, instruments, equipment and 24/7 service for the customers in the water, wastewater, agriculture, pharmaceutical and industrial sectors.

The *City of Fairborn* is located in *Southwest Ohio* and serves a population of over 32 000 residents. The Water and Sewer Division provides Sanitary Sewer Collection and Treatment along with Water Treatment, Pumping and Distribution. Thanks to the Aqua Technology Group, they are now equipped with **NIVELCO** manufactured products. Liftstation level control is a common application that can be accurately measured with the **NIVELCO** ultrasonic level transmitters or even radar level transmitters. But sometimes other challenges exist like screening equipment, wetwell conditions and operational preferences.

ULTRASONIC LEVEL TRANSMITTER AND BUBBLER CONTROLS

The wastewater operations of *Fairborn, Ohio* had recently undergone some operational changes and the original screening equipment had been reinstalled into two of their liftstations in order to make the removal of the solid particles from the incoming wastewater more efficient.

From these wetwells the collected wastewater is pumped through force mains to the wastewater treatment plant.

One liftstation had an existing ultrasonic level transmitter and controller and the other had a bubbler controller.

The operators found that the newly installed screening equipment was blocking the ultrasonic beam of the 2 part E+H level meter in the wetwell and the old bubbler system was becoming prone to failures. They needed a reliable way to control the pumps when the screens were both in and out of service.

HYDROSTATIC LEVEL MEASUREMENT

NIVELCO representative Aqua Technology Group provided a new level measurement solution using the reliable **NIVOPRESS NPK-400** series borehole level transmitters with **NAW-104** sewage adapters and **NAA-101** junction boxes. They also implemented a level switchover / backup circuit so operations could easily change from the hydrostatic to the ultrasonic if ever desired.

RELIABILITY AND FLEXIBILITY

Count on **NIVELCO** to provide a customer centric solution for all your level applications.

Dave Miller – Managing Director – NIVELCO USA LLC

MEASURING THE EFFLUENT SEWAGE WITH PARSHALL FLUME

USA

George Paris Company is in its 34th year making them one of the most experienced representatives of **NIVELCO USA LLC**, representing **NIVELCO** products in the states of Tennessee, Arkansas and the northern part of Alabama. GPC is a Knoxville, TN based company representing world-class manufacturers in the United States with a diverse portfolio offering sensors, automation, controls, power and system solutions in the water and wastewater industry, petro-chem, food, dairy & beverage, pulp & paper, research labs and more.

Our customer is a well-know American beauty-care, cosmetics and all-natural home and body cleansing agents producer. Most of their products are water-based. Consequently to this profile, the plant is a great water consumer whose wastewater portion of their utility bill is based on the total gallons of water supplied to the plant.

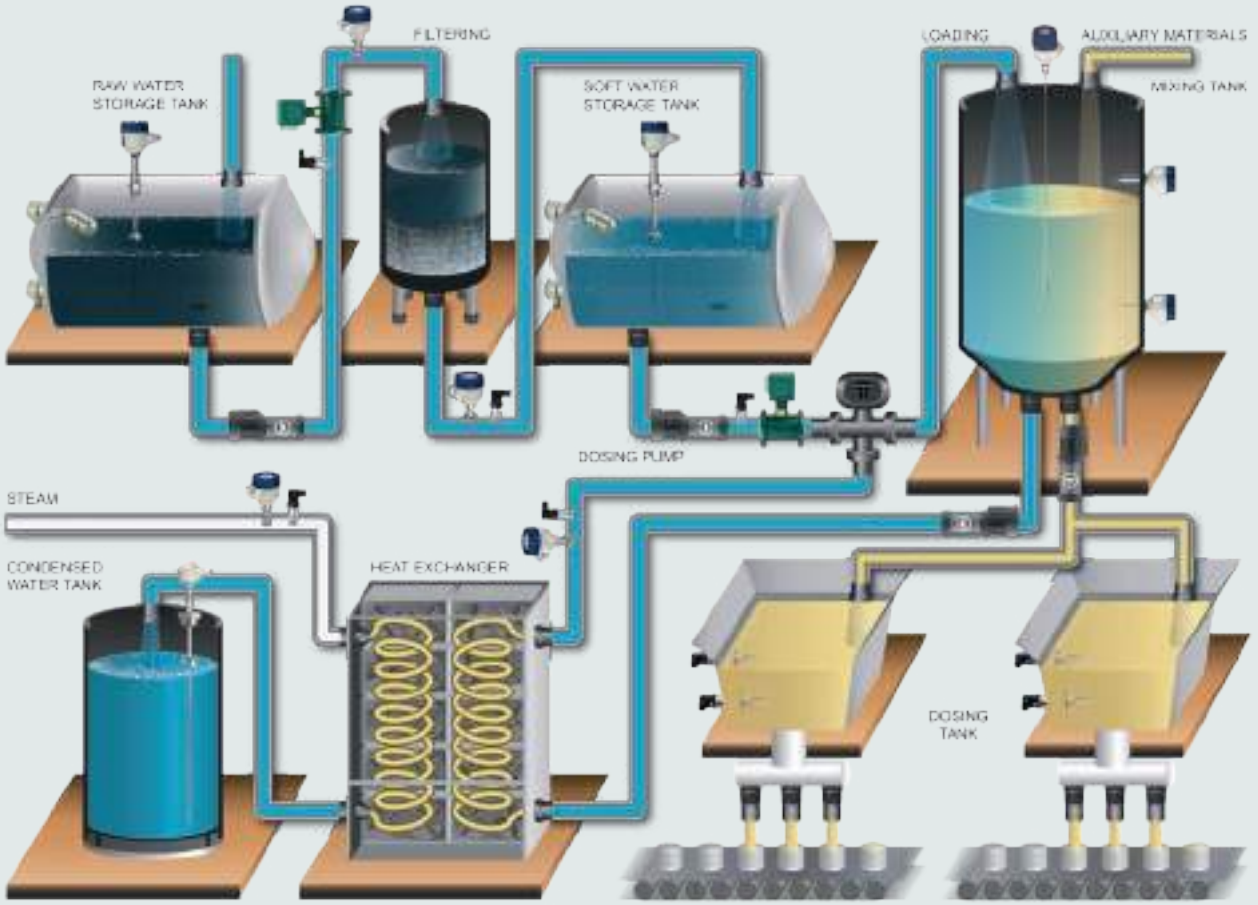
Thus, the wastewater bill the client was paying was not representative of the fractional amount of wastewater actually being discharged for treatment. Rather, the total gallons was more representative of the water being shipped to their customers in water-based products. The local utility – like other utilities – allow for wastewater credit for water being used, evaporated or shipped out so the producer is only billed for metered wastewater being discharged back to the city.

In this case, our client chose to meter using an existing 2" (P2-sized) **Parshall** flume outside their fence. Thanks to the George Paris Company an **EchoTREK** compact ultrasonic level transmitter was provided for the open-channel flow measurement with a custom-designed meter panel providing a digital display of cubic feet/sec. and cubic feet total. The utility checked the calibration in comparison to their portable 'reference' bubbler, and approved the installed measurement system and calibration.

The result is a continuous 500 – 700 USD monthly savings on the client's wastewater bill, and a payback for the discharge metering system in less than 6 months.

The ultrasonic open channel flow measurement system was operating reliably since 2009 until the utility had a pipe break recently that flooded the underground discharge, so the **EchoTREK** was submerged and was ruined. Since our client was very satisfied with the ultrasonic level transmitter he chose again a **NIVELCO** product and George Paris Company replaced the **EchoTREK** with the IP68-rated waterproof (and submersible) **EasyTREK** integrated ultrasonic level transmitter and connected it to the original meter panel.

Dave Miller – Managing Director – NIVELCO USA LLC

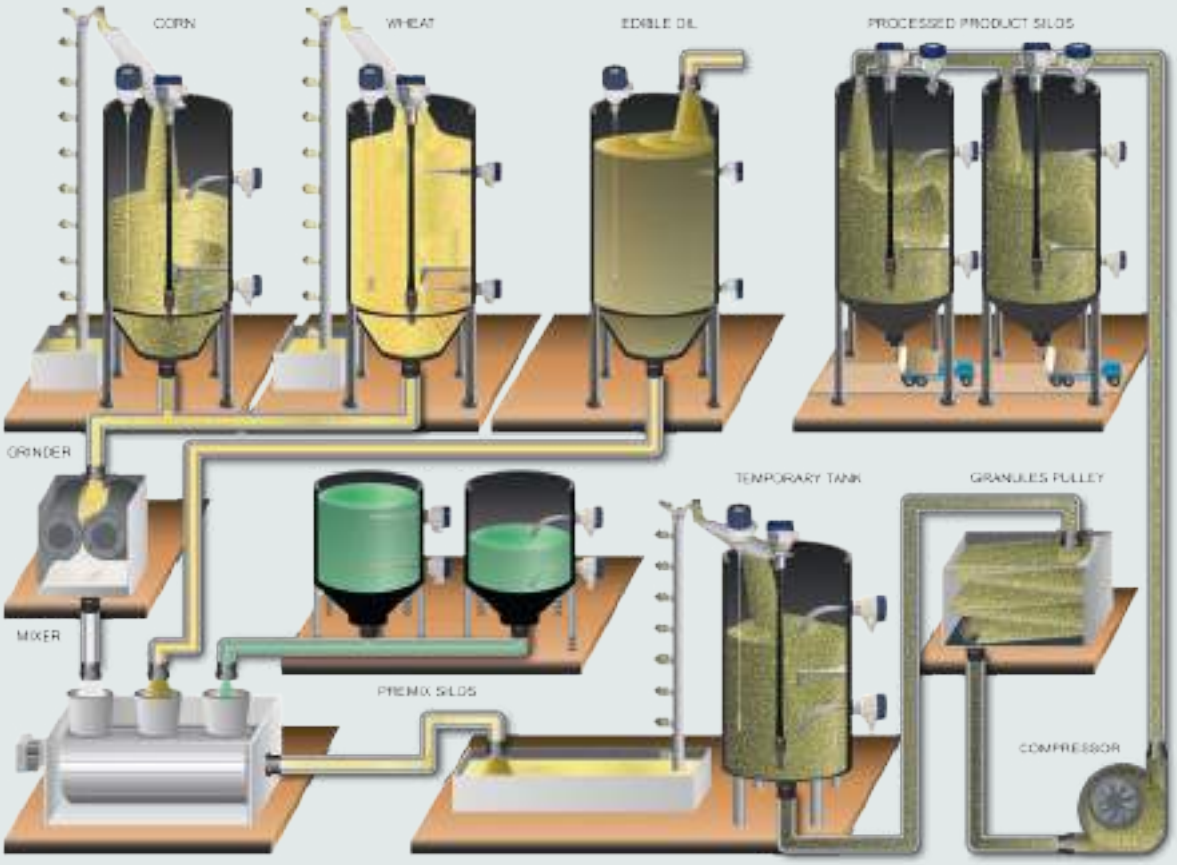


STEPS OF THE FILLING LIQUID PRODUCING PROCESS:

- Producing the required soft water from the mains raw water
- Storing the soft water in fresh water tanks
- Adding the processed water into the mixing tanks
- Adding the auxiliary e.g. salt, sugar, spices, etc. materials
- Sterilization of the filling liquid on 90 °C (194 °F) by circulating in heat exchangers
- Keeping the heated temperature at 90 °C (194°F)
- Transferring the filling liquid to the dosing machine and then dosing into the cans

INSTRUMENTATION OF THE PROCESS:

- Continuous temperature measurement with **THERMOCONT TTJ-512-2** type temperature transmitters in the soft water storage tank, the mixing tanks, the primary and the secondary side of the heat exchangers
- Continuous level measurement with **EasyTREK SPA-360-4** integrated ultrasonic level transmitter in the soft water storage tank
- Continuous level measurement with **MicroTREK HHQ-413-4** guided microwave level transmitter in the mixing tanks
- Level controlling with **NIVOPOINT MRC-205-3** magnetic tracking level switch equipped on the dosing tanks
- Low and high level indication with **NIVOSWITCH RFM-401-0** type mini compact vibrating forks in the soft water storage tank and the mixing tanks
- Dosing the soft water into the mixing tanks with the help of **ISOIL ISOMAG MS1000** magnetic induction flowmeter sensor with **ISOIL ISOMAG ML210** type converter unit with batch function



The processed animal feed is the most important raw material used in livestock farms to ensure the required vitamin intake and the balanced weight gain in the animal care sector.

MAIN MECHANICAL EQUIPMENT OF A FODDER MIXING PLANT ARE AS FOLLOWING:

- Stock storage silos (wheat, corn, edible oil)
- Mill (grinder)
- Premix storage tanks
- Mixing equipment (according to recipe)
- Storing powder mixture, granular products
- Feed mill granulation

RECOMMENDED INSTRUMENTATION FOR THE STOCK STORAGE-, PREMIX-, PROCESSED END-PRODUCT SILOS:

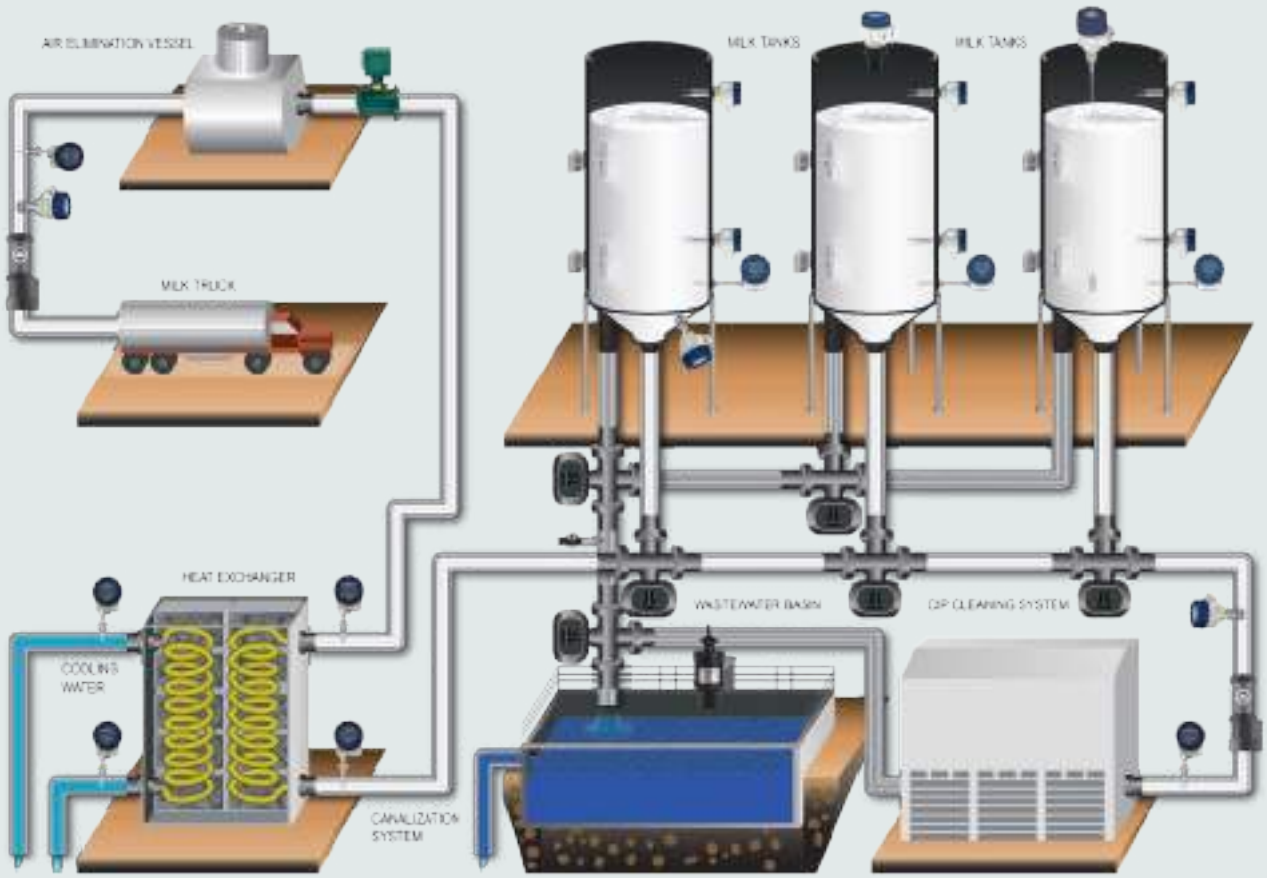
- Continuous level measurement with **MicroTREK HTN-4□□-4 Ex** type guided wave radar level transmitters
- Accessory instruments: **NIPOWER PPK-331** power supply unit, **UNICONT PGK-301 Ex** isolator power supply module, **UNICONT PDF-401-6 Ex** local display, **UNICONT PMM-311** universal controller
- Indication of full or empty status with high/low fail safe limit switches

SUITABLE LEVEL SWITCHES:

NIVOROTA EKH-7□□-5 Ex rotary paddle, **NIVOCONT RKH-5□□-5 Ex** vibrating rod, **NIVOSWITCH RRH-3□□-B Ex** vibrating fork level switch

- Multipoint temperature transmitting in silos is done by **THERMOPOINT TMH-5□□-5 Ex** with HART® output. The measured values can be displayed and stored in a PC. The PC could be connected to the transmitter by a **MultiCONT PRW** multichannel controller or a **UNICOMM SAT-304/SAK-305** HART®-USB modem.
- Continuous level measurement in the oil tanks with **MicroTREK HTK-4□□-4 Ex** type guided wave radar
- Indication of full or empty status with high/low fail safe limit switches: **NIVOSWITCH RCM-401-3** or **NIVOSWITCH RFM-401-0** vibrating fork

MILK RECEPTION



The dairy farms deliver the expressed milk to milk processing facilities. The milk receptions receive the delivered milk in the processing facility. The milk reception measures many parameters of milk (such as volume, temperature, pressure, fat content, etc.).

THE MAIN ENGINEERING UNITS OF THE MILK RECEPTION:

- Milk transfer pump
- Air elimination vessel
- Heat exchanger: the input milk should be cooled to +4 °C (+39.2 °F)
- Milk storage tanks

RECOMMENDED INSTRUMENTS: MEASURING PARAMETERS OF RECEIVED MILK:

- Volume measurement: with **ISOIL ISOMAG MS-2500** flanged sensor and **ML-210** converter units (with 0.2% accuracy). The air eliminator vessel removes air content to provide proper laminar flow.
- Pressure measurement is done with **NIVOPRESS DTE-591** hydrostatic level transmitter
- **THERMOCONT TTJ-521** transmitter is recommended for continuous temperature measurement

HEAT EXCHANGER INSTRUMENTS:

- Pressure measurement is done with **NIVOPRESS DTE-591** hydrostatic level transmitter
- **THERMOCONT TTJ-521** transmitter is recommended for continuous temperature measurement

MILK STORAGE TANKS INSTRUMENTS: LEVEL TRANSMITTERS:

- Bottom pressure transmitter: **NIVOPRESS DTE-551**
- Ultrasonic level transmitter: **EchoTREK SEA-362**
- Guided Wave Radar: **MicroTREK HTS-460**

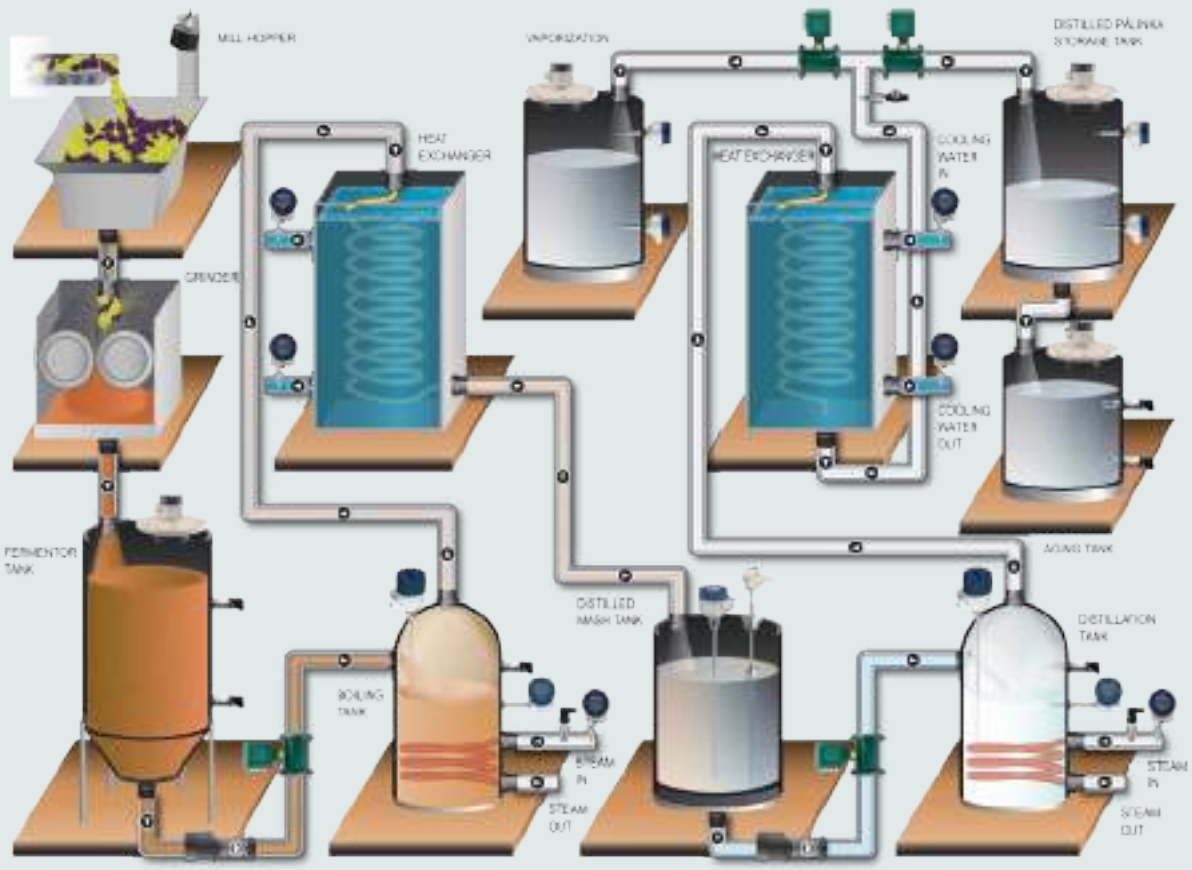
LEVEL SWITCHES FOR HIGH/LOW LEVEL INDICATION:

- **NIVOSWITCH RFM-401**, or **RCM-401** mini compact type

TEMPERATURE METERS:

- **THERMOCONT TTJ-521** with optional head position

After emptying the milk storage tanks those must be cleaned in accordance to the hygienic standards of the CIP process.



Alcohol can be distilled from agricultural raw materials such as cereals (corn, rye, etc.) or crushed fermented fruits. The final product of the manufacturing process is a special kind of distilled beverage with fruit characteristics called pálinka, which is a traditional Hungarian spirit drink. The following flowchart shows the technology and instrumentation of a Pálinka distillery. The technology has intermittent operation.

THE MAIN PARTS OF THE DOUBLE DISTILLATION PROCESS ARE THE FOLLOWING:

- Fruit crushing, fermentation
- First distillation phase: mash heating, vaporization, storage of distilled mash
- Second distillation phase: heating distilled mash, vaporization, separation of fine distilled end-product and foreshots/ heads or feints/tails
- Aging of pálinka, adjusting alcohol content

RECOMMENDED INSTRUMENTS:

- Level measurement in mill-hopper with **EasyTREK SPA-360-4** ultrasonic level transmitter and level switching with **NIVOCAP CKE-107-1** RF-capacitance level switch
- Level measurement in boiling tanks with **MicroTREK HHR-420-4** guided microwave transmitter and temperature control with **THERMOCONT TTJ-521** temperature transmitter and **UNICONT PMM-312** universal controller
- Temperature measurement of the input and output cooling water of heat exchangers and in the heating steam in boiling tanks with **THERMOCONT TBJ-521-2** temperature transmitter and pressure measurement with **NIPRESS DRC-392** pressure transmitter
- Level measurement in distilled mash tank with **NIVOCAP CTR-220-2** capacitive transmitter
- Level switching in distilled mash tank with **NIVOPOINT MRC-220-3** magnetic tracking switch
- Level measurement in the fermentation tank, distilled Pálinka collection tanks and the aging tank with **EchoTREK SGA-362-2** ultrasonic transmitters and low / high level indication is done by **NIVOSWITCH RFM-401-0** or **RCM-400-3** vibrating fork switches
- Volume measurement of the input material of the boiling tanks with **ISOMAG** magnetic induction flow meter

TEMPERATURE MEASUREMENT SYSTEM

BELGIUM

Since its launch in 2010 **THERMOPOINT** multipoint temperature transmitters provide so many success stories for NIVELCO. The transmitter family has dedicated types both for liquids and for solids so the application possibilities are almost endless. The instruments are suitable for tank farms because the measurement values can be easily collected with the help of a **MultiCONT** multichannel controller/display unit. In the following application story our readers can read about a temperature measurement system consisting **THERMOPOINT** temperature transmitters and **MultiCONT** completed with **NIVISION** process visualization software.

Thanks to the cooperation with RETEC, our Belgian distributor, **NIVELCO** provided complete instrumentation system for multipoint temperature monitoring and silo fan controlling. The end-user, Centragro scrl. is offering full range of agricultural and gardening products and services for the customers. They wanted to establish a completely new tank park next to the already existing 9 grain silos with a modern temperature measurement solution including PC-based visualization software.

THE SENT OFFER INCLUDED THE FOLLOWING UNITS:

- **THERMOPOINT TMH-57E-8 Ex** – 8 units
- **THERMOPOINT TMH-57J-8 Ex** – 1 unit
- **MultiCONT PEW-2ME-1** – 1 unit
- ADAM 4520 – RS485/RS232 module
- ADAM 4056 – RS485/Relay output module for fan control
- ADAM 4017 – RS485/7 analogue input module for humidity and ambient temperature
- **NIVISION** process visualization software

The instrumentation task was to continuously measure the medium temperature at multiple points in eight 14 m (46 ft) and one 18 m (59 ft) high silos in Dust-Ex environment.
It was also required to display the measurement data of the **THERMOPOINT** units, the ambient temperature and the humidity in order to provide effective fan controlling depending on the ambient temperature and the relative humidity. According to the settings the system has to be able to start the airing fans automatically. The measured data of all **THERMOPOINT** transmitters are sent on HART® communication line to the **MultiCONT** multichannel controller/display unit. The collected temperature data is transmitted from the **MultiCONT** by its RS485 output to the process control PC through a RS485/RS232 converter module.
The provided solution monitors and displays the medium temperature inside the tanks in all the 7 points and calculates the average temperature.
The ambient temperature and the relative humidity values are also monitored and displayed by **NIVISION**. In case of automatic operation the fans are operating within the set time interval depending on the further settings (ambient temperature or humidity) or according to the customized settings (set individually for each silo).
When the average temperature in a silo exceeds or goes below the pre-set limit values the airing fan starts automatically and stops in accordance to the set temperature difference. The selected value here determines that the fan's ON/OFF switching point (when $T_{AVG} - \Delta T = T_A$) will be how many °C less than the average temperature.

When the difference between the average temperature of the silo (T_{AVG}) and the temperature difference (ΔT) is higher than the measured ambient temperature the fan will be ON. This operation mode was required that in case of a small 0.1 °C overheat and then cooling back cannot result too frequent start-stop cycles for the fans.

Ferenc Dékány – Sales Engineer – NIVELCO CO.

THERMOPOINT TEMPERATURE TRANSMITTERS IN THE GRAIN SILOS

CROATIA

Thanks to the Falcon Electronic, – our most remarkable Croatian partner – **NIVELCO** has won an instrumentation project involving free-flowing solid material measurement in the Croatian town called Velika Pisanica, located near to the borders of Hungary. The successful project – described in details in the following – is a result of a fruitful cooperation over two years. In the framework of this continuous multipoint temperature measurement and transmission was required in four 15 m (50 ft) high silos.

Temperature of grain stored in silos needs to be monitored for maintaining quality of the stored medium. Monitoring of the total volume

of the silo is needed to provide information on accidental quality loss or appearance of germs or fungus. Eventual temperature increases alert the operator to perform operation or recycling the medium. There are 3 transmitters in each silo in a triangular arrangement along an arc, so totally 12 **THERMOPOINT TMH-56F-8 Ex** multipoint temperature transmitters was installed.

Every instrument has 6 temperature sensors providing temperature information from overall 72 measurement points at the same time.

The antistatic PE coated flexible cable probe of the transmitter is 15 m (50 feet) long and the digital thermo-sensors are placed inside the probe in every 2.5 m (8.2 inch).

The measurement data is collected, processed and displayed in the control room by a **MultiCONT PEW-2MA-1** type multichannel process controller / display unit.

The measured temperature results are transmitted to the SCADA system via RS485 line using MODBUS protocol.

During the commissioning the biggest problem was the very thin (only few millimetres (0.04 – 0.05") tank roof. Therefore it was necessary to strengthen the roof installing a supporting structure which stabilises enough the roof to resist the tensile force occurred by the filling / emptying cycles. The complete installation and the configuration of the transmitters were performed by the experts of our Croatian partner, the Falcon Electronic.

Marin Štefanac – Managing Director – NIVELCO Mjerna Tehnika d.o.o.

LEVEL METERING THROUGH THE TANK WALL

CZECH REPUBLIC

Among the several excellent features of the non-contact microwave level measurement, the most attractive one is that radar signals can penetrate through various plastic materials. These plastic materials with low dielectric constant allow measurement without loosing the impulse strength of the emitted signals and allow detecting the reflected microwave impulses. Therefore it is possible to cover the stainless steel horn antenna with plastic enclosure to protect against fumes and vapors of chemically aggressive mediums. Another way to protect the antenna from the aggressive mediums is to measure the stored chemicals through the plastic tank wall. This application possibility was used by **NIVELCO Bohemia** to provide suitable measurement solution for chemical storage tanks in a local diary plant. The customer, a creamery in the *Czech Republic* produces dairy products and uses some types of corrosive chemicals for example in the cleaning process where the level measurement of these mediums are really challenging for all instrument manufacturers.

The chemicals are stored in 2 closed 1 m^3 (35.3 ft^3) sized plastic tanks. The customer's demand was to continuously measure the level of the chemicals using non-contact radar measurement and **NIVELCO Bohemia** offered the **PiloTREK** as the best choice for high accuracy and highly reliable level measurement through the plastic tank wall.

Despite the excellent features of the pulse burst radar principle and **PiloTREK** itself, the metal construction around the tanks was a serious problem to be solved, since the tanks are kept in metal constructions to keep them upright. This metal construction is a disturbing object in the aspect of non-contact microwave measurement, so we decided to provide a free test where we could find answer for the question that is it possible to measure accurately in such an extraordinary measuring arrangement. The test was made using a **PiloTREK WEM-150-4** with DN50 stainless steel horn antenna. The unit was mounted approximately

1 m (3.3 feet) above the top of the tank. It was necessary to find the best place between the bars of the metal construction otherwise false signals could be detected.

The set-up and parametering was made by the Eview2 configuration software aided with intuitive and user-friendly interface.
It provides quick and easy setting of any **NIVELCO** instrument using HART® communication.

During the test **PiloTREK** did extraordinarily well reaching 3 mm (0.12 inch) accuracy. The results were satisfying also when the level was decreased rapidly in very short time, though it was just a simulation, since under normal operating conditions the level will never decrease so fast. The customer was very satisfied with the test results and also with the approach of **NIVELCO** as well with the purchased units. Our instruments likewise the provided services once again proved **NIVELCO**'s high quality and **NIVELCO Bohemia** accomplished again a challenging measurement task.

Vojtěch Samec – Managing Director – NIVELCO Bohemia s.r.o.

NIVELCO IN THE ICE CREAM FACTORY

The Hungarian EISPRO Kft. produce many types of ice cream in its factory located in Törökbálint, near to Budapest. They are leading players of the ice cream market in Hungary, they have over 100 employees. This article allows detailed insight into the production of ice cream and presents the applied **NIVELCO** instruments.

STEPS OF THE ICE CREAM PRODUCTION

Storage of the raw materials and other components; Blending the ingredients and create mixture; Heat treatment (pasteurization); Cooling; Aging; Frozen foaming; Batching, forming and hardening; Packaging; Storage and distribution.

The EISPRO Kft. has a long-period cooperation with **NIVELCO**, therefore there are no any process in their ice cream production technology where we could not find **NIVELCO** instruments.

INGREDIENTS (LIQUID AND DRY) STORAGE

- The main ingredient of the ice cream is milk which is stored in outside silos. These dual-wall silos are continuously measured by **NIVOPRESS DTO-561** hydrostatic level transmitters at the bottom and **THERMOCONT TSP-121** resistance thermometers.
  The measurement values are displayed with **UNICONT PMM-311** universal controllers.
- The additive powdery materials are stored in open containers.

Blending: Based on the proper recipe the ingredients are mixed then the mixture is forwarded into closed tanks. In this phase the level and temperature of the mixture is measured similarly to the previously described: **NIVOPRESS D** hydrostatic level transmitters and **THERMOCONT TSP** temperature sensors are used.

Heat treatment: The main purpose of the pasteurization is to create suitable microbiological state for the ice cream. The pasteurization is performed by a heat exchanger at minimum 80.6 °C (177 °F) temperature for 20 seconds. After the pasteurization the mix is homogenized by means of high pressure (100 – 120 bar g / 1450 – 1740 psi g) and then it is passed across a double type heat exchanger for the purpose of cooling the mix to refrigerated temperatures.

The temperature is controlled by a **UNICONT PMM-311** device. The temperature sensor is a fast response **THERMOCONT TSG-111** Pt100 sensor. Cooling and aging: In this phase the additional components – which are less tolerant to the heat treatment – such as fruit pieces and juices are added to the mix as well the other auxiliary materials.

Then the ice cream is filled into 2.5 m (8.25 ft) tall tanks and frozen to -25 °C (-13 °F) for 24 hours.

These tanks are equipped with **MicroTREK HTS-425-4** guided microwave level meters which transmit 4 – 20 mA output signal proportional to the mass of the stored ice cream.

Of course the temperature is also measured and controlled by **UNICONT PMM-311** instruments.

Cleaning: Technological equipments are cleaned with CIP (Clean-in-Place) process. The level in the CIP tanks is measured by **EchoTREK SEA-380** compact ultrasonic transmitters. Temperature control of the washing liquids is done by **UNICONT PMM-311** universal controller. **NIPRESS DRC-2A2-2** transmitters are used for pressure measurement in the washing system.

Waste management: During the production many unwanted by-products and waste are generated. It was an interesting task to measure the dense impurities resulted by the cleaning process and the remaining organic waste which accumulate at the bottom of the tanks. From all technological processes the mentioned slurry-like material is pumped into two 4 m^3 (141 ft^3) concrete pools where it is thickened. This sludge waste – waiting for annihilation – is pumped into mobile

metal outside containers. The containers have lids that can be opened so the measurement solution was an **EasyTREK SPA-360** ultrasonic level transmitter mounted on a **NIVOSONAR SAA-108** console.

This way the transmitter measures the level through the open lid. Further signal process is done by a **UNICONT PMG-411** universal controller which indicates the fullness in percentage and stops the pump in case of reaching the high fail safe level.

The EISPRO Kft. is very much satisfied with the NIVELCO instruments and this was proven by letting our Marketing team to shoot pictures and videos about the ice cream production and of course our instruments in action.

István Horváth – Head of Domestic Sales – NIVELCO CO.

EDIBLE OIL PLANT WITH NIVELCO INSTRUMENTATION

HUNGARY

The NT Food Kft. in *Kiskunfélegyháza* town produces hot pressed, extracted, raw and refined sunflower cooking oil. A modernisation project was began in order to equip the plant with most efficient technology to be capable to extract the highest oil content from the raw materials.

During the primary pressing most of the oil content can be extracted from the oil-seeds such as sunflower or rapeseed.

The remained seed dollop contains much oil that canbe extracted. In order to this the dollop is treated with solvents which releases the desired final product.

The extraction procedure is used where the oil-content is required to reduce fewer than 20%. The extraction can be used as a single process, but usually it is combined with pre-pressing.

This way the oil content can reduced to 15 – 20%. Combined usage of the two processes has the advantage in significant efficiency increasing with cost savings of the pressing and achieving better oil yield.

After the proper preparation the solvent oil mixture is stored in an extraction tank. Then the soluble components will be removed and the solvents will be dissolved from the bleached medium, separating the extracted oil from the reusable solvents.

The solvent dissolving is performed by multi-level vacuum and steam distillation under vacuum. The high difference between the boiling points of the solvent and the oil, the process can be regarded as a distillation.

The **NIVELCO** instruments were installed at the extraction hall. The main measurement task here is the level and temperature

monitoring of 4 tanks containing solvent-oil mixture. In contrast to the pressing, the entire extraction system should be equipped with ATEX approved devices which means remarkable costs.

The other important parameter, the temperature is in direct proportion with the diffusion. The higher is the temperature, the faster will be the diffusion.

At high temperature the solubility of the oil will increase and its viscosity will be reduced. Both phenomenon results faster extraction so this process is recommended to perform at high temperature. The optimal temperature for the oil extraction process with hexane is +150 °C (302 °F).

Therefore the high medium temperature, low dielectric constant of the medium and the explosion-proof environment were considered in the instrument selection.

NIVELCO temperature sensors track the complete extraction process with 15 **THERMOCONT TSP-211-0** and 42 **THERMOCONT TSP-215-0**.

The 4 distillation tanks are equipped with 4 **MicroTREK HHS-410-8 Ex** high temperature and ATEX approved type guided microwave level transmitters with coaxial probe.

Since inside the tank there is a heat-steamed coil it is not possible to mount the probe the usual way.

The transmitters are mounted to a bypass chamber. The coaxial probe was necessary because the measurement range is only 1 m (3.3 ft) and the coaxial probe has no dead band. The transmitters measures within 5 mm (0.2 inch) accuracy and transmit 4 – 20 mA output signal to control variable-frequency drive which operates the pumps.

Measured level data are displayed on 6 **UNICONT PMG-400** universal controllers. Supply voltage of the loops is provided by **NIPOWER PPK-331** power supply modules.

The **NIVOPRESS DTE-651-2** and **NIVOPRESS DTE-551-8 Ex** hydrostatic level transmitters are mounted at two vacuum measuring points. One of these units measures the actual vacuum value of the extractor, the other measures the pressure of the extraction process above 100 °C (212 °F). The vacuum values are controlled by PLC based on the 4 – 20 mA output signals of **NIVOPRESS** transmitters.

Local displaying and programming of the instruments can be done with the help of **SAP-203** plug-in displays.

The half-year test phase of the measurement system was very successful and our customer asked for an offer on expanding the instrumentation. Moreover the process visualization system covering the entire production process is already under progress.

Tibor Asztalos – Domestic Sales Engineer – NIVELCO CO.

LEVEL MEASUREMENT OF A TANK FARM IN BEVERAGE PRODUCTION

HUNGARY

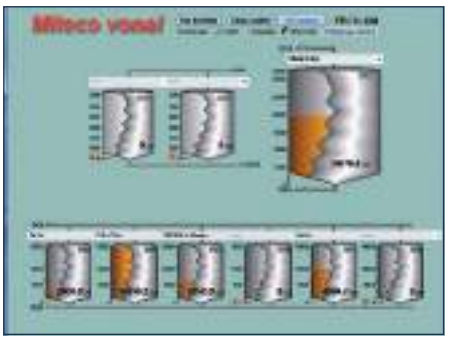
The Coca-Cola Company is the world's leading beverage retailer. The Hungarian site of Coca Cola Company in *Dunaharaszti* operates 2 bottling and 10 regional distribution centres, its annual production capacity of one billion litres. Thanks to the previous successful instrumentation projects of **NIVELCO** we received a new request for providing further instrumentation solutions for other tasks.

Regarding the customer demands and the needed measurement accuracy, we made an offer for a continuous level measurement solution, for 17 standing stainless steel tanks, after a careful site-survey. We offered for this task our guided microwave **MicroTREK** radar transmitters.

Further demands were the local display of the measured values and centralised parameterisation possibility of the transmitters. The obvious choice for this purpose is the **MultiCONT** multichannel process controller. Summarisation and displaying of the measurement data is performed by a PC running the **NIVISION** process visualisation software. The main advantage of microwave (radar) level measurement is the ±5 mm (0.2") accuracy along with the maximal operational safety. Moreover the measurement is independent from dielectric constant, temperature, pressure and density changes and applicable for mediums with turbulent surface, and capable of ignoring dense dust, vapour or pressurized gas layers above the product surface. It is a key feature that **MicroTREK** transmitters are suitable for using in and with CIP (Clean-In-Place) procedures which involves a 90 °C (194 °F) alkaline and acidic cleaning process.

IN THE ASPECT OF THE DEMAND FOR A LOCAL DISPLAY, THE 17 TANKS CAN BE DIVIDED INTO 3 SECTIONS:

- **MicroTREK HTF** transmitter (8 units)communicating with a **MultiCONT PEW-18B-1** process controller



- **MicroTREK HTF** transmitter (7 units) communicating with a second **MultiCONT PEW-18B-1** process controller
- **MicroTREK HTD** twin-probe transmitter (8 units)connected to two **UNICONT PDF-501** loop indicators.

The **UNICONT** units provide local display of the measured data and transfer the HART® signals to a **MultiCONT** placed in the control room.

In order to be able to use the whole capacity of the tanks, a special mechanical solution was necessary to be constructed on the top of the tanks. The special narrow standpipe facilitates that dead-zones of the transmitters are 'shifted' outside of the tanks so even the highest level of the filling does not reach the instrument dead-zone.

Therefore it was essential to increase the measurement accuracy because the contents data is indicated in litres via a linearization table. Along with the level measurement there are also frequent laboratory tests checking the compliance of the ratio between each component. After the step-by-step measurement and the blending, the finished carbonated products pass into the bottling-line. The accuracy needed to keep to the required formula of the recipe is achieved by a 20-point linearization table. With the help of the **MultiCONT** multichannel process controller it is very easy to specify a linearization table, in this case we assigned the measured value in millimetres to volume in litres. The **MicroTREK** transmitters transfer measurement signals to the **MultiCONT** controllers by HART® communication. The **MultiCONT** units collect the data of the three sections of the tank-farm per groups and communicate with the central control computer using an RS485 communication line. On the PC our **NIVISION** process visualization software performs reliable visual indication of the tank-farm.

Tibor Asztalos – Domestic Sales Engineer – NIVELCO CO.

NIVELCO

ULTRASONIC LEVEL TRANSMITTERS FOR MILK APPLICATIONS

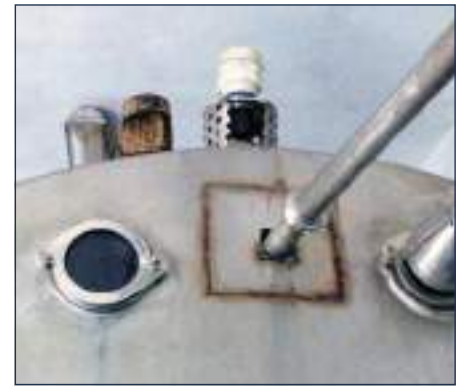
The safety and wholesomeness of dairy products is highly dependent upon the effective control of unwanted micro-organisms in the dairy plants.

One method is Pasteurization which destroys disease-causing bacteria and significantly reduces the number of spoilage organisms.
As everybody knows, food industry products like milk demands high hygienic requirements and it has to be handled with uttermost care against contamination.

Hence in such cases contact type level transmitters like **NIVOCAP** capacitance (due to insulated sensor as well as counter weight) or float operated **NIVOTRACK** (due to contamination around float) cannot be used for this application either with PFA plastic coating, because bacteria can adhering on the probes. Conventionally in milk applications the differential pressure (DPT) transmitters or flush diaphragm based hydrostatic level transmitters like **NIVOPRESS D** are used. In this second case the devices are equipped with sensor filled with food industry compatible oil (as pressure transmitting medium) and DIN 11851 pipe coupling or TriClamp sanitary process connection.

But still as the density of the milk varies batch to batch there can be effect on the accuracy of these transmitters. Also the cost of needed regular maintenance is quite high in these cases. Hence more and more users prefer the non contact measurement solutions. In the milk plant in Mangalore, India there are three milk storage tanks with 15 000 litre (530 ft^3) capacity which should be continuously measured.

We have offered our ultrasonic level transmitter **EchoTREK SGV-380-2** for these applications suggesting the specific type of installation as there were criticality of CIP process where there can be steam and the temperature can go up to 90 … 95 °C. C.I.P. stands for cleaning-in-place generally done with specific chemicals in first stage and then hot water /stem is used for defined time for sterilization depending on silo structure. But in certain cases it may shoot up to 90 … 95 °C (194 … 203 °F). Also due to the temperature factor and the acid/ caustic used for tank/silo cleaning it was necessary to use PVDF transducers, which is more resistive than the standard PP plastic.



Another really important aspect of the application which made ultrasonic principle suitable is that the milk is cooled in the tank and the filling is performed very slowly from the bottom to avoid foaming. Milk usually tends to foaming which could make ultrasonic level measurement impossible. Because of the temperature factor as well as steam, it should be ensured that the flange / transducer surface temperature does not exceed 90 °C (194 °F) and the steam should not get condensed on the transducer surface causing functional difficulties.

To reduce the temperature at flange / transducer a perforated nozzle was used. This also helped to drastically reduce the possibility of settling down the steam on transducer face and getting condensed on it. It is true that this arrangement is not possible in all the applications where perforated nozzles cannot be allowed. But at the majority places the solution was well accepted in order to provide suitable circumstances for reliable and accurate level measurement with **EchoTREK** ultrasonic transmitters.

Shrikrishna N. Deshpande – CEO – NIVELCO Instruments India Pvt. Ltd.

WHAT TO BE ENVY OF: CHOCOLATE LEVEL MEASUREMENT

NIVOPRESS D HYDROSTATIC LEVEL TRANSMITTER IN INDIA

The Barry Callebaut Group is the world's leading manufacturer of high-quality chocolate and cocoa products, operating in more than 30 countries, and having their manufacturing plant in *India* at *MIDC Ranjangaon Tal. Shirur dist. Pune*.

M/s Barry had a requirement to check continuous level of molten chocolate in storage tanks as well as circulation tanks during their process while having temperature 45 °C inside the tank, the density of molten chocolate is 1.20 kg/cm^3, and a single stage agitator is presented in the tank hence there is a restriction for the selection of level instruments.

SELECTION OF THE INSTRUMENTS

The contact type instruments, like capacitance type transmitter (**NIVOCAP**), guided wave radar type transmitter (**MicroTREK**), and float operated magnetostrictive type transmitter cannot be considered due to an agitator & the contamination of product, also their production process is not allowing to insert anything inside the tank.

Non-contact type instruments like ultrasonic level transmitter & radar type instrument was not possible because of the restriction of available space for installation on top of the tank. Then taking the advantage of the fact that the density remains constant throughout the process, the hydrostatic level transmitter model **NIVOPRESS DTF-631-2** was selected with pressure transmitting media between pressure sensor & sensor diaphragm food grade oil. The model **NIVOPRESS D** was installed near the center of the conical tank bottom, and is meeting the satisfactory level of customer's process requirements. In consequence of customer satisfaction, other two spare instruments were purchased.

Deepak Kulkaruni – Asst. Manager Marketing & Customer Support – NIVELCO Instruments India Pvt. Ltd.

LEVEL MEASUREMENT IN EDIBLE OIL STORAGE TANKS

NETHERLANDS

Nivotherm B.V. – based in Hendrik Ido Ambacht located near to *Rotterdam* – represents **NIVELCO** and its product portfolio in The *Netherlands* for more than 10 years. Our company is dealing with industrial process automation products, especially level sensors, transmitters and level switches which are popular instruments in many industry segments used in various processes. Our primary targets are the water / wastewater, marine or the food & beverage industry, but we are continuously searching for new opportunities and new markets for the represented manufacturers.

This application success story is about an instrumentation project where we had to supply continuous measurement solution for our food-processing partner. The task was level measurement in edible oil storage tanks, so it was no question that we should offer **NIVELCO**'s ultrasonic level transmitters.

Our customer Maro Elektro Service is the process automation supplier for Van Schelven B.V., a trader and processor company of grains, seeds and pulses. Bio Perserij Flakkee (subsidiary of Van Schelven Company Group) is located in the western part of the *Netherlands* in *Nieuwe-Tonge* village, near to the Northern-sea coast and they are specialized for manufacturing cold pressed edible oil.

In 2013 an expanding project was started and 4 new oil storage tanks were installed only 100 meter (330 feet) away from the older 4 oil tanks, so they have now 8 tanks in total. Besides the level measurement in the 10 meter (33 feet) high stainless steel tanks Van Schelven required an inventory control system completed with a local display at the bottom of the tanks.

We offered 2-wire **EchoTREK SEP-362-4** ultrasonic level transmitters with **MultiCONT PRC-240-1** multichannel process controller / display units. The customer ordered the recommended instruments for all 4-tank systems, so totally 8 **EchoTREK** transmitters and 2 **MultiCONT** controllers were delivered. The 4 older tanks will be equipped in the near future.

Thanks to this successful process instrumentation project new doors were opened in front of us. Recently 6 new silos were built to expand the storage capacity for a new oil pressing facility at the same location. Our customer is counting on Nivotherm's expertise in the realization of the instrumentation and we are planning to install 6 **MicroTREK** guided wave radar level transmitters into the new silos for inventory control of the seeds.

Oscar Bijl – CEO – Nivotherm B.V.

ANACONT LIQUID ANALYTICAL TRANSMITTERS IN THE AGRICULTURE

PORTUGAL

BRESIMAR Automação was founded in 1982 exactly in the same year as **NIVELCO**, so both companies have more than three decades of experience in the field of industrial automation. We are representing **NIVELCO** products in Portugal for almost 20 years. Our headquarters is located in *Aveiro*, only 80 km south of Porto, close to the Atlantic Ocean seacoast.

In the southern corner of Portugal in Faro city the pumping station of greenhouses use **NIVELCO** manufactured liquid-analytical instruments in the irrigation system thanks to BRESIMAR. The liquid what is used for irrigation – for the plants produced in the greenhouses – is a mixture of water and fertilizers which requires continuous measurement of level, pH value and electrical conductivity.

THE APPLIED UNITS ARE THE FOLLOWING:

- **AnaCONT LCK-232-2** mini compact EC transmitter – 2 units
- **AnaCONT LGP-121-2** compact pH transmitter + LAP-120 probe protection tube – 2 units
- **NIPRESS DRC-432-2** hydrostatic level transmitter – 2 units

In case of greenhouse plant production the irrigation system is very important to provide the suitable components with well-chosen intensity of irrigation and fertilizing. The tanks of the fertilizer dosage system contain soluble fertilizers dissolved in water which is pumped into the mixing tank, where it is diluted with water, and then sprayed to the crops.

The optimal concentration of the water diluted fertilizer is continuously checked redundantly by two **AnaCONT LCK** mini compact electrical conductivity transmitters and two **AnaCONT LGP** compact pH transmitters equipped with **SAP-300** graphic displays. The water

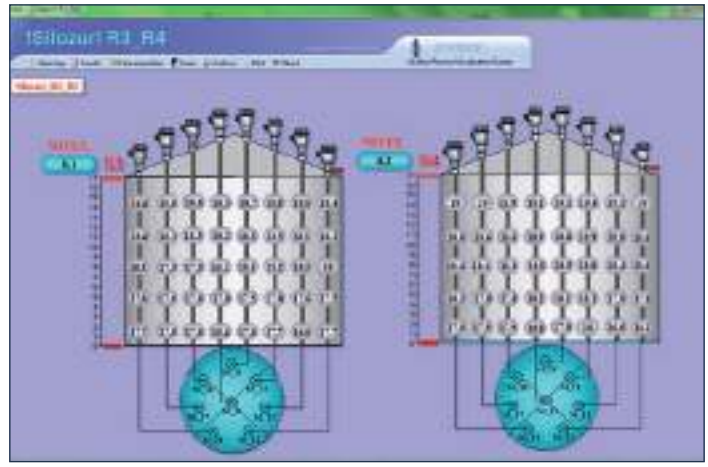
amount to be mixed with the fertilizers is measured with **NIPRESS DRC-400** series mini compact hydrostatic level transmitters mounted on the input pipe-network.

The transmitted 4 – 20 mA measurement values of the **NIVELCO** instruments are handled by a process controller computer which is responsible for the entire process control of the irrigation system.

Pedro Marques – Technical Director – BRESIMAR Automação S.A.

LEVEL AND TEMPERATURE MEASUREMENT SYSTEM

ROMANIA



THERMOPOINT TMH AND EASYTREK SCD TRANSMITTERS IN GRAIN SILOS

For almost 10 years, since its foundation the primary goal for **NIVELCO Tehnica Masurarii** subsidiary company is to satisfy the costumer needs and to earn their trust by continuously following the constantly improving level measurement technologies and providing suitable solutions for the market requirements.

All of this cannot be achieved without high level professional work, without establishing honest relationships with the partners and without providing the best measurement solutions required by the applications. To achieve our goals we have to keep up with many competitors and this is assured by the high-quality products with very good price / performance ratio manufactured by **NIVELCO**.

In the recent years, the real challenge to us was to continue the improvement and growth of our company in this rapidly changing market environment. The successful results are represented by awards, several references and most importantly the confidence of our customers which can be measured in the increased number of enquiries and direct requests.

All over in Romania there are many **NIVELCO** products installed in various industrial and agricultural applications, mostly as important components of an existing complex instrumentation system, but in many cases **NIVELCO** units are able to create a complete system. The following case study is an example from those agricultural applications where full instrumentation was built with **NIVELCO** devices and **NIVISION** software.

Thanks to the technical level we provide for this project the customer chose the **NIVELCO**'s solution despite the offers of our well-known competitors and some other lower priced offers.

Our customer the AVIMIX APA S.R.L. company in *Bucharest* uses a Danish technology to establish grain drying and storage systems and one of these facilities is located really close to the Hungarian border in the town of Szaniszló. The task was to provide complete level and temperature measurement system for four grain silos. In addition to the continuous measurements local display in the central control room and the display of the measured data in an office computer was also required along with data-logging.

ACCORDING TO THE SIZE OF THE SILOS THE FOLLOWING DEVICES WERE INSTALLED:

- **THERMOPOINT TMH-55D-8 Ex** 28 units
- **THERMOPOINT TMH-55G-8 Ex** 4 units
- **EasyTREK SCD-33J-8 Ex** 4 units
- **MultiCONT PRW-2MA-1** 3 units
- **NIPOWER PPK-331-1** 2 units
- JAD-4520 (ADAM adapter) 1 unit
- **NIVISION** software

Designing of the cable-architecture and the cable routes for the proper communication was also the part of our task. Since the commissioning was done by the customer the delivered devices needed to be pre-configured and labelled according to the cable-architecture design.

After the installation of the measurement system there was an intensive one month testing period while all the silos were filled with grains and the logged measurement data were investigated much more frequently than the planned. The end-user was very satisfied with the operation of the system and the representatives of the Danish supplier of silo system were spoken also admiringly about the provided complex measurement solution.

Antal Máthé
– Technical Consultant –
NIVELCO T.M. S.R.L.

EASYTREK TRANSMITTERS IN EXTREME DUSTY ENVIRONMENT

ROMANIA

SOLAREX S.R.L is a leading animal feed producer in *Romania*, their annually produced amount of different type poultry feed reaches significant share on the market. The main players of this industry segment require economic and safe processes for the feed's raw material manufacturing. Moreover the produced materials should be suitable for animal consumption approved by International and European feed safety certifications.

The most important instrumentation task for our customer was to provide stock management and monitoring solution of the stored raw materials – such as grains, cereals and additives – needed for the feed receipts. The process control system and the operating personnel should always have proper information about the amount of the stored materials in order to be able to keep the needed amount of raw materials prepared and available for meeting the regulations of the strict receipts.

The accuracy requirement and the extremely dusty environment were the two main aspects for the instrument selection. We usually recommend ultrasonic level transmitters for such dusty media for example flour or grinded cereals.

We had to provide continuous measurement solution for overall 29 closed tanks filled with various grain flours, soybean flour, sunflower flour, and other additives. The measurement data is processed by central control system, so local displaying was not needed. The ideal choice was the **EasyTREK** integrated ultrasonic level transmitter.

14 concrete silos with 13.5 metre (45 feet) height are equipped with low (30 kHz) frequency **EasyTREK SCD-33J-8 Ex** type Dust-Ex approved ultrasonic level transmitters. The instruments provide 4 – 20 mA output proportional with the measured level. The 4 – 20 mA output signals are processed by a SIEMENS process control system, which controls all technological processes.

INSTALLED INSTRUMENTS:

- **EasyTREK SCD-33J-8 Ex** ultrasonic transmitter (14 units)
- **EasyTREK SCD-34J-8 Ex** ultrasonic transmitter (15 units)

In the other 15 silos with 10 m (33 feet) height highly adhering powdery materials are stored. To provide reliable and accurate measurement solution for this application again the ultrasonic level transmitters had been chosen.

The applied **EasyTREK SCD-34J-8Ex** type Dust-Ex approved ultrasonic level transmitters also send the measurement data to the process control system.
In accordance to the demand of our customer not only the supplying, but the complete commissioning of the whole measurement system was done by the team of **NIVELCO** Tehnica.

The measurement system was realised in the framework of a successful **NIVELCO**-Siemens cooperation, proving that our instruments are able to face all challenges of this food industry segment.

András Olteán-Péter – Managing Director – NIVELCO T.M. S.R.L.

OPEN-CHANNEL FLOW MEASUREMENTS WITH EASYTREK

TRADE WASTE FLOW METER FOR BREWERY

A new startup Craft brewery contacted Aqua Technology Group to provide a trade waste interceptor flow meter solution for their new brewery.

Like other startup brewery operations, they faced the challenge of not knowing the exact flow requirements and the uncertainty of production scaling. **NIVELCO** representatives from Aqua Technology Group worked with the owner to provide a comprehensive flow and monitoring solution with the reliability and accuracy of **NIVELCO** instruments.

92% of brewing ingredients are wasted. Most of the waste is spent grain. By far the most common use of spent brewers grain is as animal feed. Wastewater from a brewery may be discharged into city sewer system after the wastewater has undergone some treatment.

The brewery must be completed to obtain Council approval to discharge trade waste to sewer. It is the responsibility of the brewery to obtain this approval.
The city required 5% or better accuracy throughout a wide range of flows while the brewery owners wanted little maintenance and no chance of blockage.

Flow measurement in the brewery and beverage industry is a common application that can be accurately measured with the **NIVELCO** ultrasonic level transmitters and primary flow devices such as flumes.

ULTRASONIC FLOW MEASUREMENT AND PROCESS MONITORING

NIVELCO representative Aqua Technology Group provided a new ultrasonic flow meter and level measurement solution using the reliable **EasyTREK SPA-39N-4** type ultrasonic level transmitters with the **MultiCONT** universal display and controller. A 4 inch Palmer-Bowlus flume with approach section was provided as the primary flow device. The system was setup and calibrated to read LPM (Liter pro minute) and display a separate totalizer for both the brewery and the city sewer utility. The data is logged internally in the **NIVELCO** flow meter system and made available to the city when required. The **MultiCONT** was

also provided with expansion capabilities so the brewery can add pH, DO and other monitoring parameters to the **MultiCONT** controller and process control system as they scale.

EXPANSION AND FLEXIBILITY

Count on NIVELCO to provide a customer centric and scalable solution for flow measurement, pH, DO and all your beverage process applications.

EFFLUENT FLOW MEASUREMENT FOR DUAL V-NOTCH WEIR

The *City of Lebanon* is located in Southwest Ohio and serves a population of just over 20 000 residents. The Water and Wastewater Division provides Sewer Collection and Treatment for the city and surrounding communities. Thanks to the Aqua Technology Group, they are now equipped with reliability and accuracy of **NIVELCO** instruments.

Wastewater treatment plant effluent flow measurement is a common application that can be accurately measured with the **NIVELCO** ultrasonic level transmitters. However, this application was different in that it had two v-notch weirs in parallel to handle the flow requirements.

ULTRASONIC FLOW AND LEVEL TRANSMITTER

The wastewater operations for the *City of Lebanon, Ohio* had an existing flow meter that had failed after just two years of operation. Operations also reported that the flow meter on the effluent never matched what they were receiving on the input. The operators found that the ultrasonic level sensor of the 2 part Magnetrol/STI flow meter was not staying level and becoming prone to failures. They needed a reliable way to measure flow going across both v-notch weirs and add flow pacing to the other process controls.

V-NOTCH WEIR FLOW MEASUREMENT

Therefore, in the field of public utilities new **EasyTREK** ultrasonic level transmitters with the **MultiCONT** universal display and controller was provided for the flow meter and level measurement.

The IP68 rated **EasyTREK SPA-38N-4** integrated ultrasonic level transmitters are installed to a console above the basin. The units use HART® digital communication to connect in multidrop loop to the **MultiCONT** multichannel process controller. The **MultiCONT** is able to provide remote programming and display measurement results.

The specialist of Aqua Technology Group adjust the instrument's calibration to read the flow across both v-notch weirs and send the data back to the central SCADA system along with using the additional output of the **MultiCONT** to flow pace UV disinfection and their effluent wastewater sampler.

The complete measuring system proved to be an excellent solution, since it performs highly reliable operation, and high accuracy measurement solution.

Dave Miller – Managing Director NIVELCO USA LLC

NIVOTRACK LEVEL TRANSMITTERS IN THE DIARY FACTORY

SLOVAKIA

NIVELCO LEVEL TRANSMITTERS IN THE SHEEP DAIRYING

Microwell spol s.r.o. was founded in May 1992. Since that time the company has been dealing with measuring and process control engineering. The corporate activities got broadened by adding manufacturing, installation, application and marketing of industrial and non-industrial electronic equipments – especially air conditioning and industrial dehumidifiers –, engineering and consulting activities in the related areas into our company portfolio.

The cooperation with **NIVELCO** started in 1992 so the successful business relationship between the two companies is more than 20 years old. Our headquarters is located in the town of *Vágsellye (Šala)*, only 135 km far from Budapest, Hungary. This small distance between us certainly served a huge role that we became one of the first European distributors of **NIVELCO**. It's a special pleasure for us that from *Slovakia* – a small country with only 5 million inhabitants – we won the most successful distributor title for 8 times in the annual **NIVELCO** sales contest, leaving behind the representatives of much larger countries. **NIVELCO** instruments can be applied in all areas of industrial manufacturing and agricultural production. One of our partners in the agricultural field use entrusted Microwell to create a continuous measurement system which is able to provide accurate information about the yield of sheep milk. The demanded system needed to be able to monitor the milking of each sheep and determine the total quantity of milk obtained.

BASIC REQUIREMENTS FOR THE DEVICE WERE THE FOLLOWING:

- possibility of measuring milking of at least 20 sheep at the same time
- the min. volume to be measured is 1.5 liter (50 oz) for each sheep
- at least 1 mm (0.04") resolution
- the device should be portable
- the measurement data should be evaluated and graphically displayed on the PC

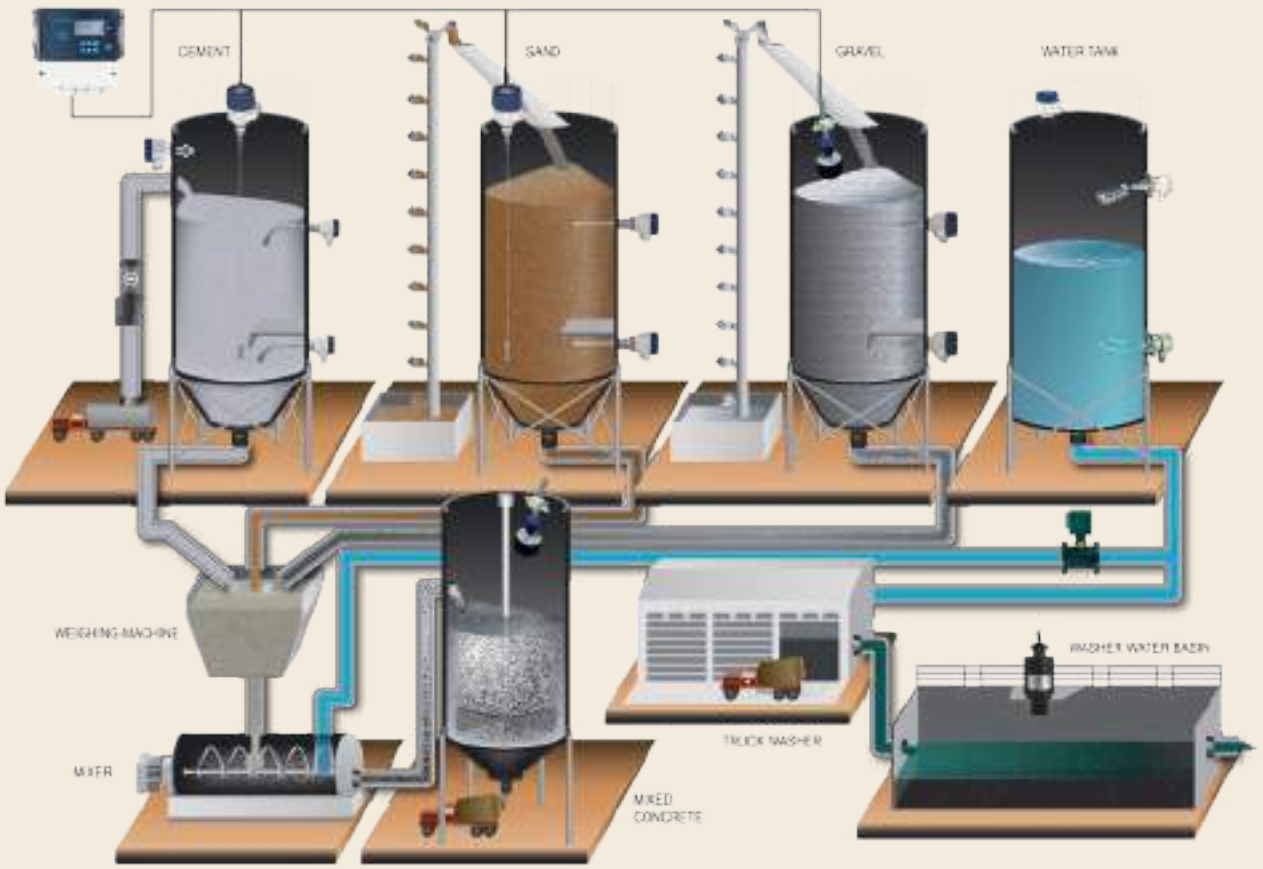
The established measurement system allow the customer to find out how the milking of each sheep changes depending on different seasons, respectively on different ways of feeding and also to find out which breeds of sheep are the most profitable for the specific site from the point of maximizing milk quantity.

For this application the experts of Microwell designed a system for automatic measurement and result evaluation, which can measure the milking of 24 sheep simultaneously. The system consists of a measurement device and evaluation software of measurement output data. The measurement device stores the expressed milk in transparent plastic cylinders, where **NIVOTRACK MTA-506-3** type magnetostrictive level transmitters are used for accurate milk level measurement. The measuring system includes a total of 24 **NIVOTRACK** devices that automatically start measuring, measure the desired values and automatically end the measurement.

Thanks to the very high resolution (up to 0.1 mm) the units measure the milk level with high accuracy and high reliability and subsequently transmit data to the evaluation program for further processing. The evaluation device consists of I/O modules, PC and the measured data processing software customized to the customer requirements.

Tibor Kovács – CEO – Microwell spol. s.r.o.

CONCRETE PRODUCTION PLANT



The demand for high quality concrete is growing rapidly, due to the changing requirements of the construction industry. Extreme construction conditions and tougher regulations are the main driving forces behind this change. To satisfy the demand, production of high quality concrete requires state of the art instrumentation and computerized control.

THE MAIN PRODUCTION UNITS OF THE PLANT ARE

Cement storage silos; Sand, gravel storage silos; Auxiliary storage tanks; Water tanks; Weighing system; Mixer; Mixed concrete storage tank; Truck washer system

INSTRUMENTATION OF THE CEMENT STORAGE SILOS

The cement arrives at the plant by truck and it is transferred into the silo by pneumatic filling.

It is important to continuously monitor the level of the cement, the air pressure above the cement level and provide an indication of high and low fail safe levels.

MicroTREK HTN-400 guided microwave level transmitters are recommended for level measurement, **NIVOROTA EKH-400** rotary paddle level switches for low/high fail safe switching and **NIVOPRESS DTF-500** pressure transmitters are recommended for pressure measurement, with the **UNICONT PMG-411** type display and controller.

INSTRUMENTATION OF SAND, GRAVEL STORAGE SILOS

The level measurement of these silos can be done with **MicroTREK** guided microwave radars or **EasyTREK SCD-300** type ultrasonic level transmitters.
For low/high level switching vibrating rod or vibrating fork level switches are recommended. The low level switches always have to be mechanically protected from damage by a plate mounted above them.

INSTRUMENTATION OF THE WATER STORAGE TANKS & DIRTY WATER TANKS

For level measurement, ultrasonic level transmitters are recommended (**EchoTREK/ EasyTREK**) while level switching can be done by **NIVOMAG MKA-200** type magnetic coupling level switches.
The flow measurement of the water used in concrete production is done by **ISOMAG** magnetic flowmeters which have dosing/ control functions.

INSTRUMENTATION OF CONSTRUCTION RAW MATERIAL TANKS

CZECH REP.

Refrasil s.r.o., based in the city of *Trinec*, is one of the leading manufacturers in the field of temperature-resistant materials in *Czech Republic*. Their main profile is the manufacturing of fire clay bricks, insulating materials, mortars, cements, concrete etc. In the middle of last year, the management of Refrasil decided to expand their tank farm with 21 brand new silos containing various construction raw materials, as free flowing solids.

There were numerous requirements on the instrumentation project, such as non-contact continuous measurement, high level indication, high reliability and minimum 2-year full warranty.

The project was entrusted to a subcontractor company to design and document the complete project, including all technological processes and automation. The demands from the instrumentation section were sent out to **NIVELCO** along with many of our German competitors. After the technical evaluation of the offers supplied, only 2 companies, **NIVELCO** Bohemia and Endress+Hauser qualified into the final stage. Both companies, as level experts, presented a similar measurement solution at the same technical level, so it was a difficult choice for Refrasil.

On the positive side for **NIVELCO** Bohemia, that we had perfectly operating reference installations at Refrasil. Despite this advantageous situation, both companies had to prove, during a test phase, their statements about reliable level measurement in an extremely dusty environment.
The joystick aiming feature of the ultrasonics for solids provides an easy approach to finding the optimal sensor positioning. This is a very important aspect of solid material measurements because the coning or arching caused by the medium filling / emptying process.

Installed instruments for test:
- NIVOCONT RKK-502-1 vibrating fork level switches (4 units)
- EchoTREK STD-34J-4 ultrasonic transmitters (4 units)

NIVELCO has a remarkable amount of experience in this field, so the success of the test phase was not in question.

Thanks to the successful test and our good relationship with the subcontractor and with Refrasil, we gained a significant advantage against our competitor. Moreover we offered the same technical solution at a competitive price.

Providing professional technical support along with the 5-year full warranty – valid from 2018 – produced the expected result, as **NIVELCO** won the instrumentation project.

A local display of the measurement was not of interest, so 21 **EasyTREK SCD-34J-4** integrated ultrasonic transmitters were installed. The high level limit indication is performed by 21 **NIVOCONT RKK-502-1** vibrating rods. Measurement data for all silos is supplied to a PLC which controls the emptying / filling process in accordance with the levels measured by the transmitters.

NIVELCO again showed its power and benefited from decades of experience in ultrasonic level measurement of powdered solids.

Since the project has been commissioned, the instruments have operated flawlessly, and our customer is satisfied, that his choice of **NIVELCO** equipments has been justified.

Vojtěch Samec – Managing Director – NIVELCO Bohemia s.r.o.

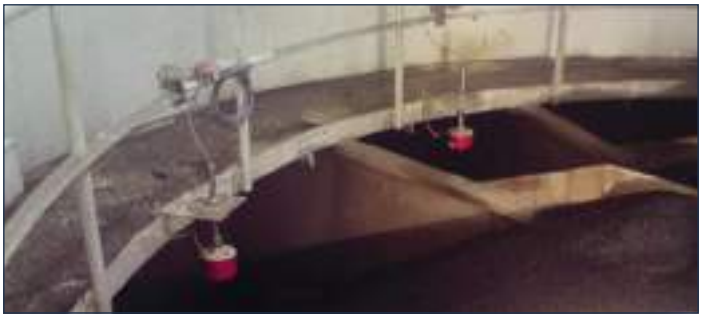
CONCRETE MANUFACTURING PLANT OF EKOCEM

POLAND

One of our prospective customers asked for a quotation for replacing an out-of-date level metering system (produced by one of our competitors) for controlling the level of sand, cement and different types of gravel in segmented silos. In addition to this, the system has to ensure safety with a fail-safe high level indication, even in the case of a failure of the level measurement.

Experts from **NIVELCO-Poland** proposed the well known ultrasonic level meters for solids, the **EasyTREK SCD-340-4** type with HART® communication.
Additional elements of the system included a **MultiCONT** process controller unit expanded with **UNICONT PJK** universal interface modules for control of filling and emptying the chambers of the silo as well as to generate a high level alarm.

Measurement of sand, cement and different sized gravel is performed in 10 m (33 ft) tall silos in extremely dusty environments.
Stones are loaded directly into the silos, producing quite high acoustic noise and strong vibrations.
The operational processes became more fluent and the control process for filling and emptying became fail-safe with the overfill protection



added by the additional **EasyTREK SCD**. In a very important benefit for the working environment, the system helps to improve working conditions, the safety at work, and the health of employees, previously exposed to extreme dusty and unhealthy conditions.

All instruments work in HART® Multidrop loops, which allows remarkable cost-savings on the installation. During the mounting of the instruments the proper location had to be considered carefully, especially for the high level alarm sensor, because the mounting console is above the filling apparatus. All of the control and alarm signals were integrated with the existing control system on the plant.

All delivered instruments work reliably and provide credible sources of information about level in the silos.

Mechanical and electrical installation was done by the **NIVELCO-Poland** team, in addition to commissioning, configuration and optimization of the instrument settings. The whole system operates flawlessly, since it has been brought into use for the great satisfaction of the customer.

Dariusz Piszer – CEO – NIVELCO Poland Sp. z o.o.

NIVELCO

PILOTREK TEST IN THE COAST OF THE BLACK SEA

Recently **NIVELCO** has achieved a great success by developing its own K-band pulse burst radar level transmitter, the **PiloTREK W-100** series and became one of few companies in the world disposing this advanced non-contact level measurement technology. The 25 GHz non-contact **PiloTREK W-100** transmitters were introduced in the end of 2012 and until now (the first quarter of 2014) hundreds of units have been commissioned since the product launch and proved that we can count with them in level measurement tasks of liquids, masses, emulsions and other chemicals.

In the following we offer to read about a pilot project, where the **PiloTREK** transmitters were tested in a challenging application in our partner thanks to **NIVELCO Tehnica Masuraii**, the Romanian subsidiary of **NIVELCO**.

The spring season in 2013 was started for us with an enquiry coming from the company SARGEANT MARINE ROMANIA S.R.L. about continuous level transmitters. The subject of the measurement task was 160 °C (320 °F) bitumen in different diameter silos in order to proper stock management.

Since this tank farm instrumentation project was a long-term plan in customer's strategy, we offered the **PiloTREK W-100** series for testing. After the brief discussion about the mounting possibilities and conditions, a smaller 7.9 m (25.9 feet) high tank had been prepared for the test. According to the provided technical drawings the customer took care about the suitable mounting nozzle where the **PiloTREK WHS-150-4** high temperature type unit was installed.
The instrument was connected to a data logging capable **MultiCONT PRD-210** process controller unit to monitor the measurement data.

The test was performed between June and the middle of September, 2013 and in this time period we collected 11 220 measurement data by logging in every 10 minutes. The measured values have been perfectly matched with the controlling measured values made by the customer in the meantime with the traditional manual method. The customer was very satisfied with the test results and purchased the equipment used for the test. The similar tanks are now under consideration to be equipped with following **PiloTREK** transmitters.

Antal Máthé – Technical Consultant – NIVELCO T.M. S.R.L.

STONE CRUSHING AND ASPHALT PLANT

SWEDEN

27 ECHOTREKS FOR SOLIDS

Since Afriso Ema AB has became the exclusive distributor of **NIVELCO** Process Control Co. in Sweden the successful cooperation resulted in more installed **NIVELCO** instruments in *Sweden* than ever before. The highlighted items of this success are the members of **EchoTREK STD/SBD-300** series ultrasonic level transmitters for solids applied in the construction materials industry.

The other challenging circumstance is dust what is unavoidable at a stone crushing and asphalt plant, like in the outside of *Malmö, Sweden* where 27 **EchoTREK** level transmitters for solids are installed.

Equipped in 15 – 30 m (50 – 100 ft) high silos in very dusty environment, besides high acoustic noises and strong vibrations the ultrasonic level transmitters work reliably and are credible sources of information about the stored amount of crushed stone in the silos.

In case of level measurement of solid materials such as crushed stone with various granular sizes, the coning or arching is a general feature caused by the filling and emptying process. This effect needs to be carefully considered in order to achieve appropriate level measurement. Optimising the aiming by the **SAA-102** joystick – which is an integrated part of the **EchoTREK STD/SBD 300** series transmitters – is really advantageous in these situations.

Even if the material is a bigger size stone or a fine powder the **EchoTREK STD/SBD-300** series ultrasonic level transmitters are ideal for the measurement task.The incorporated SPDT relay output provides high alarm indication in order to avoid any possible overfill.

Jonas Ericson-Nihlstorp – CEO – AFRISO EMA AB

PILOTREK & NIVELCO CK APPLICATION

ROMANIA

NIVELCO INSTRUMENTS IN THE COAST OF THE BLACK SEA

The company SARGEANT MARINE ROMANIA S.R.L. require a measurement task about continuous level measurement of 160 °C (320 °F) bitumen in different diameter silos in order to proper stock management. We offered the **PiloTREK WHS-150-4** series high temperature level transmitter.

The instrument was connected to a data logging capable **MultiCONT PRD-210** process controller unit to monitor the measurement data. The test was performed for long months and the measured values were continuously compared with manually measured values by the customer. Thanks to the successful test results the customer was very satisfied and purchased the equipment for further tests in October 2013. Finally after a really long consideration period the long-term customer satisfaction resulted in the order for the complex instrumentation system of the complete bitumen tank farm in August 2015.

The end-user SARGEANT MARINE ROMANIA S.R.L. is an England-based company having leading role in the Romanian road construction industry for nearly 20 years considering the amount of produced bitumen. The company's facility is located in *Constant*,a in the coast of the Black Sea where the bitumen is stored in seven high capacity (9000 m^3) tanks.

THE MEASUREMENT TASK WAS THE FOLLOWING:

- Continuously measure the stored volume in the tanks
- Temperature measurement in three points inside the tank
- Providing high fail-safe alarm with sound and visual indication
- Local displaying of the measurement data
- Collecting and logging the data in a central computer
- Volume correction based on the measured temperature

Along with the listed tasks, **NIVELCO** Tehnica Masurarii done the preparation of the control rack and performed the wiring of the system and the commissioning. The provided solution included the following **NIVELCO** instruments:

- **PiloTREK WHS-150-4** – 1 unit
- **PiloTREK WJS-182-4** – 6 units
- **THERMOCONT TBC-526-4** – 21 units
- **NIVOCAP CMV-115-1** – 7 units
- **MultiCONT PRD-2MA-1** – 3 units
- **NIPOWER PPK-331-1** – 2 units
- ADAM-4520 (RS232 to RS422/485 converter module)
- ARMASONO SH (sound and visual alarm device)
- **NIVISION** process visualization system

PILOTREK & NIVELCO CK APPLICATION

ROMANIA

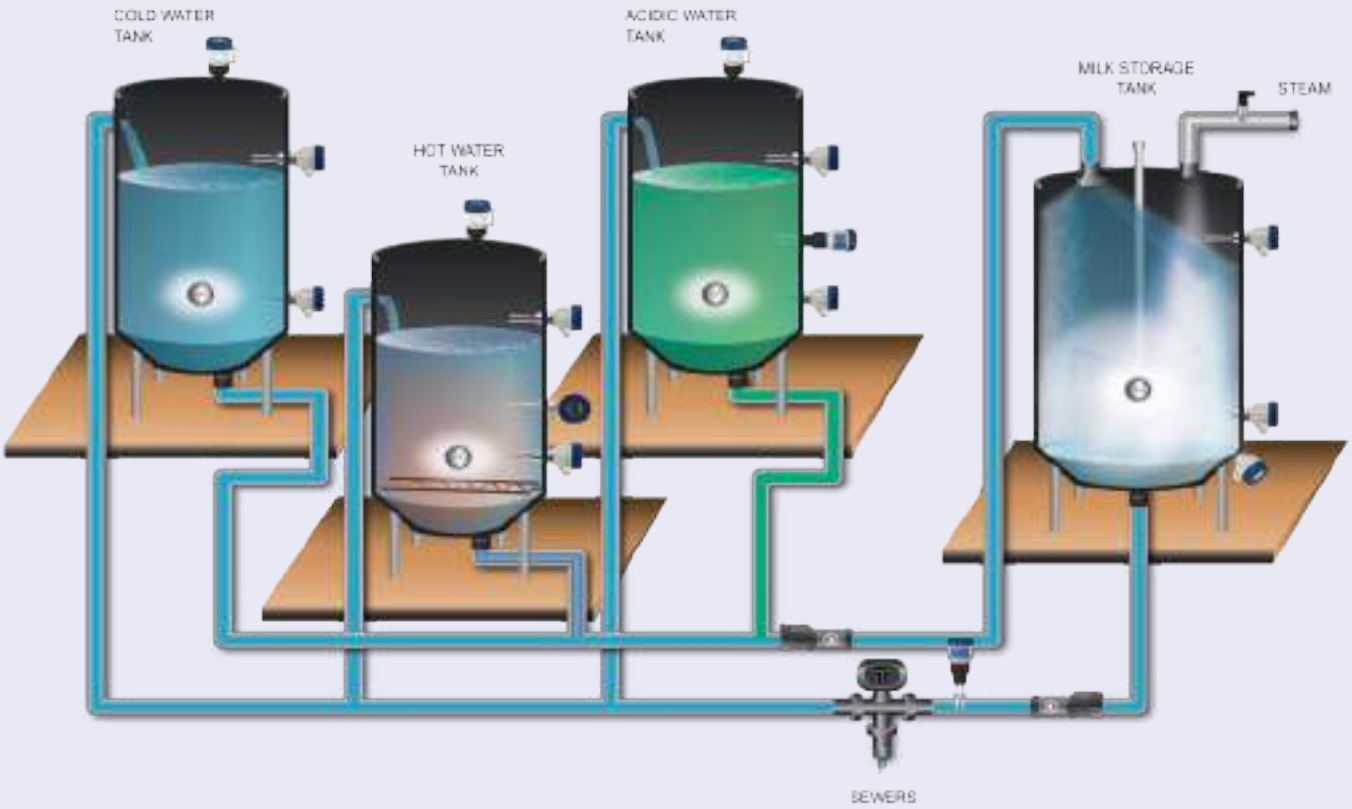
The **THERMOCONT** temperature sensors are equipped in equal distance, three sensors on each tank within the active measurement range.

The high temperature type **NIVOCAP CK** capacitive level switches are mounted that the probes are sensing if the tank is filled up to 80% and the high temperature type **PiloTREK** Pulse Burst Radars are continuously measuring the level of the hot bitumen. During filling the tank the **NIVOCAP CK** level switches send switching signals to the sound and visual alarm devices to warn the personnel to stop the filling. The measured level and temperature values are transferred by HART® communication to the 3 **MultiCONT PRD-210** controller/display unit and sent on RS485 line to the process control PC running **NIVISION**. Processing, storing and displaying of the measured data are done with the **NIVISION** process visualization software.

Moreover the program calculates precise volume from the measured level values based on the tank dimensions. The compensation of the thermal expansion (to 15 °C (59 °F) as a standard value in this industry) is calculated from the average temperature (based on the currently measured level). The stored amount in the tank is displayed in kilograms which are calculated based on the average density determined by the internal lab. This average density can be entered into the software after each and every filling procedure.

After we have made the necessary fine tuning, slight corrections and final tests, the measurement system was reported as completely finished personally by the owner of the company from England. The system is now operating for 4 years without any failure to the greatest satisfaction of the local personnel. This way we would like to say thanks for the colleagues at SARGEANT MARINE for their support in providing the required process connections rapidly and for their kind assistance in the wiring and the commissioning part of this successful instrumentation project.

Antal Máthé – Technical Consultant – NIVELCO T.M. S.R.L.



Strict regulations of the food industry require that food production plants regularly clean the tanks, pipes and pumps of a technological process. The standardized cleaning procedure insures that all residual material is removed after finishing a production process.

MAIN STAGES OF THE CLEANING PROCESS ARE:

- Washing with cold water
- Washing with hot water +82 °C (180 °F)
- Washing with a slightly acidic solution (concentration: 2 – 5%)
- Disinfection with +130 °C (266 °F) steam

These technological steps should be repeated if necessary. This so called CIP program is controlled by a PLC. The needed cleaning solutions are prepared in a CIP washing centre. The washing solution that is used several times gets contaminated and it is drained to the sewer.

COLD WATER TANK: For analogue level measurement **EchoTREK SGA-300** type 2-wire ultrasonic level transmitters are recommended; for low / high level switching **NIVOSWITCH** vibrating fork level switches are the best choice. Dosing of the supplementary water is controlled by a PLC and an ultrasonic level transmitter.

HOT WATER TANK: Similar instruments are used for level measurement and low / high level switching as for the cold water tanks. The temperature measurement and control system consists of a **THERMOCONT TTJ-500** temperature transmitter and a UNICONT PMM-300 universal controller.

ACIDIC WATER TANK

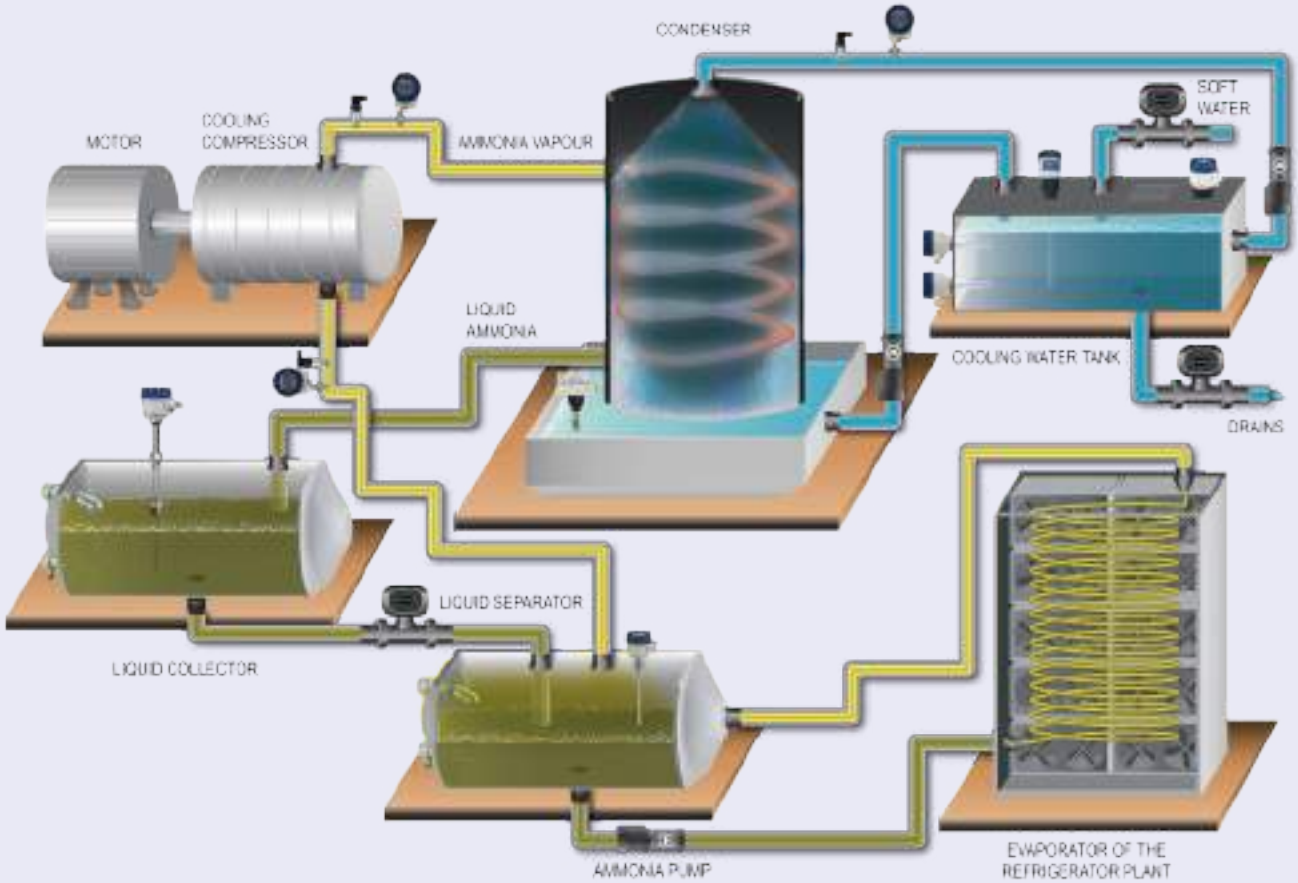
Recommended instruments:

- EchoTREK SGA-300 type ultrasonic level transmitters for level measurement
- Coated **NIVOSWITCH** vibrating forks
- Adjusting the pH value of the water can be done by using the following instruments, **AnaCONT** pH meter, **UNICONT PMM-300** controller, **JEL-111** dosing timer and a dosing valve.

STEAM CLEANING PHASE: Measuring and controlling the pressure of the steam is done by a **NIPRESS DRC-300** pressure transmitter and a **UNICONT PMM-300** controller.

DETECTION OF THE DIRTY CLEANING WATER: Water contamination is measured by an **AnaCONT** conductivity transmitter and the 4 – 20 mA output signal is led to a PLC which controls a 3-way valve.

COOLING CIRCULATION PROCEDURE



An important mechanical part of the chemical- and pharmaceutical industry is the refrigerator plant, where the necessary cooling energy for the technology is produced.

COMPRESSOR AND COOL DOWN CONDENSER

The first main part of a refrigerator plant applying ammonia (NH_3) as coolant is the refrigerator compressor which increases the pressure and temperature of the inhaled ammonia. The measurement of the pressure on the suction and pressure side is accomplished by **NIPRESS DRC-3□□** type pressure transmitter, the measurement of temperature is completed by **THERMOCONT TTJ-5□□** temperature transmitters.

The sucking side pressure transmitter performs the power control of the compressor, while the pressure side transmitter controls the condenser. As a consequence of the cooling condenser procedure the NH_3 turns back into liquid phase and transferred into the liquid ammonia collecting recipient and ammonia liquid-separating recipient.

LIQUID COLLECTING AND LIQUID-SEPARATING RECIPIENT

As the ammonium level decreases in the liquid-separator tank, the necessary liquid for the process is refilled from the liquid tank. The continuous level measurement is executed by **NIVOCAP CTR-2□□** type capacitive level transmitter. This device controls the feeding valve applying the **UNICONT PMM-311** type controller. The upper and lower failsafe switching is executed by **NIVOMAG MKA-210** type level switches. As high level is reached the compressor shuts off, while at low level the ammonium pump is stopped.

COOLING WATER TANK

The condenser cooling water tank ensuring the cooling water for the condenser. A continuous level measurement is accomplished with **EchoTREK SGA-3□□** type ultrasonic level transmitter. The level in the tank is kept constant by the help of a **UNICONT PMM-311** type controller by actuating a supplementary water valve. Continuous conductance measurement is executed with an **AnaCONT LGK-2□□** type device. The conductivity of cooling water is permanently increasing due to the evaporation in the condenser. At a predetermined value **PMM-311** controller opens the emptying as well as the supplementary valve.

MICROTREK TRANSMITTERS IN GLAXOSMITHKLINE

GlaxoSmithKline is one of the world's leading research-based pharmaceutical and health-care products supplier companies. GSK was intended on replacing the capacitive level transmitters on the vaccine fermentors so they were searching for new instruments on the market.

The fermentors play central role in the vaccine production process and considering the fact that the production system consists of one-week long cycles the primary demand was the highest possible reliability. Any measurement error or failure might result unsuccessful one-week production cycle generating significant losses.

THE STRICT REQUIREMENTS WERE THE FOLLOWING AGAINST THE LEVEL TRANSMITTERS:

- Continuous level measurement of different pH and density liquids for example high purity water, washing liquid, fermentation liquid
- At least ±1% accuracy
- 4 – 20 mA analogue output
- Linearization table for volume calculation
- The fermentors are regularly sterilized with steam and decontaminated so the instruments have to bear 150 °C (302 °F) medium temperature for the heating up to 30 – 45 minutes
- The fermentors have vibrating motors so the instruments have to measure reliably during strong vibration, along with the medium movement caused by the mixing

The main demand was not only the high accuracy and highly reliable measurement in the high temperature production process. The other essential requirement was the easy integration to the existing automation system and the high hygienic requirements involving special demands of the pharmaceutical environment:

- The physical and the geometric dimensions of the old rod probe type capacitive level transmitter should match with the new replacement instrument
- At the end of the rod probe there should be no closing element due to cleaning consideration
- The instrument should fit into the existing connect nozzle process connection of the fermentor
- All wetted parts should be made from $R_a < 0.4$ surface roughness 316Ti stainless steel and full PFA coating
- All wetted part should have Material Document and Product Assessment Report of all applied parts in accordance to the EN 10204 standard

NIVELCO's **MicroTREK HHO-412-4** type guided microwave level transmitters meet all these requirements, so GSK decided to replace the capacitive level transmitters. The fully PFA coated rod probe instruments have 1½" TriClamp process connection.
This special type was uniquely manufactured for the first time for this project. After the first operational experiences small mechanical and electrical modifications were done together with the engineers of GSK after multiple site visits and consultations with experts of **NIVELCO** in order to achieve the best possible accuracy.
At the moment there are 4 **MicroTREKs** operating on the fermentors and there are other 4 **MicroTREKs** as safety backup units. Thanks to this successful project and fruitful cooperation in the following season there are many other special instrumentation tasks waiting for us to be solved by a suitable, **NIVELCO** manufactured level transmitter.

Tibor Asztalos – Domestic Sales Engineer – NIVELCO CO.

DEMANDS ON HIGH-TECHNOLOGY MEASUREMENTS IN CHEMICAL WORKS

HUNGARY

In the chemical and pharmaceutical industries the accurate measurement of materials in the stock-storage silos is regulated by ISO standards, so the applicable measurement instruments have to satisfy increased requirements in this industrial area.

The primary demand is high accuracy, independently from the measurement range. The minimal accuracy needed is 5 mm (0.2"), but in several cases measurement values have to be provided within a measurement error of 1 – 2 mm (0.04 – 0.08"). In parallel with high accuracy, the long-term operational stability required is even more stringent. The applicable regulations define several calibration procedures to be undertaken on an annual basis, without the possibility of transporting the instruments to the factory for any reparation or adjustment. In most cases the special mediums to be measured require explosion-proof instruments. Moreover the instruments have to be suitable for the measurement of materials with a low dielectric constant (ε_r).

There are two product families of level transmitter solutions developed and produced by **NIVELCO Process Control Co.** which satisfy these requirements:

- **NIVOTRACK M-500/600** magnetostrictive level transmitters: Typically we offer rigid rod probe versions of **NIVOTRACK** transmitters up to 3 m (10 ft) probe length, and flexible probe versions are recommended above 3 m (10 ft) because of easier packaging, transporting and handling. The wide range of the applicable floats provide reliable solutions for low density (below 0.85) mediums up to 0.4 g/cm^3 (400 oz/ft^3) viscosity. Moreover this measurement method is independent from the relative dielectric constant (er) of the measured medium. Stainless steel probes are not applicable for use in chemically aggressive mediums, in this case we offer a PFA plastic coated probe version with a plastic (PP or PVDF) float.
- **MicroTREK H-400/500** microwave level transmitters: **MicroTREK** guided microwave level transmitters are very popular, especially for high temperature applications.
- Flange temperature of the stainless steel probe versions can reach +200 °C (392 °F), moreover the measurement is not affected by physical parameter changes of the medium, such as temperature or pressure. Since the reflection of the microwave signals is highly dependent on the relative dielectric constant (er) of the measured medium, it is essential for microwave measurement to have $\varepsilon_r > 1.4$.

In the case of hazardous substances it is necessary to use intrinsically safe devices. In the applications where transparent HART® communication is needed to provide remote parametering, **NIVELCO** offers the **UNICONT PGK-301-B Ex** isolated power supply modules.

Sándor Ujfaludi – Domestic Sales Engineer – NIVELCO CO.

INSTRUMENTS IN THE PESTICIDE PRODUCTION

A major player of the domestic chemical segment is Agrokémia Zrt. based in *South-North Hungary*. Main profile of the company is the production of pesticides which are essential for the modern agriculture industry. They also produce many types of chemicals, antifreeze and even starch.

In 2011 a major instrumentation project began in the Emulsion Concentrate and the Colloid plant. In this project **NIVELCO** acted as a prime contractor and designed the entire monitoring system. This included the instrumentation of the chemical equipments and the storage tanks as well the unified computer based controlling system.

On-site service needed professional experience of **NIVELCO** sales engineers because many instruments are operating in hazardous area.

EMULSION CONCENTRATE PLANT

In this plant they change the properties of the pesticide agent by adding emulsifiers and auxiliary materials which make it soluble in water. This process – called EC formatting – enables pesticide agent to be solved in water and the final result is what we known as sprayable pesticide. The organic solvents of the plant are stored in 10 outside laying tanks equipped with **NIVOTRACK MTC-522-8** type magnetostrictive level transmitters with 1mm resolution. Output signals of

the transmitters are displayed in a **MultiCONT PRC-24A-5 Ex** multichannel process controller which transfers the measurement data on RS485 line to the **NIVISION** process visualization software. The software performs stock management and fills the calibration report after the comparison with the stored receipt. Mixing of the emulsions is done in a 10 m^3 (353 ft3) vacuum tank. The filled material is measured by load cells under the tank. The temperature is measured by **THERMOCONT TBC 521-8 Ex** ATEX certified temperature transmitter mounted into the bottom of the tank. The solved medium from the mixing tank is forwarded to two pieces of 20 m^3 (706 ft^3) so called batch tanks to be able to provide equal quality. Level measurement of the tanks is done by **EchoTREK SGF-380-8 Ex** compact ultrasonic level transmitters as well temperature is measured by **THERMOCONT TBC-521-8 Ex** temperature transmitters. A sample from this tank is examined for quality control reasons and when the laboratory approves the quality of the semi-finished product then it is allowed to go packaged.

In the next process the processed material is assigned with a batch number and dosing machines with multiple heads fills it into 1, 5, 10 or 20 litres containers made from PE or PA.

Further demands about the process controlling system were the average filling weight and tolerance monitoring, the solvent usage monitoring, controlling of the EX formatting, batch volume measurement and accurate filling weight measurement. Number of the containers passing through the filling line was counted by **NIRED IRV-111-1** infrared sensors.

COLLOID PLANT

In the Colloid plant a base-suspension is produced which means that agents – which are immiscible in water – are mixed in accordance to the receipt and ground it to powder. The dosing is also based on weight and **NIRED IRV-111-1** infrared sensors count the passing containers.

All transmitters, infrared sensors and even the load cells are connected to the controlling server. This computer is running a **NIVISION** process visualization software which enables the unified data management of the measurement values, visual displaying of each process and batch tracking with receipt logging. The system stores and archives all relevant production data such as raw material consumption or the number of filled containers. All events can be searched back meeting the requirement of the quality control.

The finished instrumentation project provides a cost-effective manufacturing process and increases productivity.

Ákos Noll – Domestic Sales Engineer – NIVELCO CO.

SALT SILO MEASURING APPLICATION

AUSTRIA

ECHOTREK LEVEL TRANSMITTER FOR SOLIDS IN AUSTRIA

The ASFiNAG is an Austrian publicly owned corporation which plans, finances, builds, maintains, operates and collects tolls on the entire primary road network. The ASFiNAG is fully owned by the *Austrian Republic*.

In recent years ASFiNAG built new salt silos which are able to hold almost the total volume of salt consumed during a "Typical" winter. The company was looking for a measuring system for their salt silos. The silos are 6 m diameter with 12 m height and will be used for about 350 m^3/h salt.

Until the application of the new measuring system they only had the guess of the truck driver during the filling time, which sometimes caused a big problem to calculate the next salt order.

The delivery of the salt is done by trucks and there can be problems with it, because the silo must be completely emptied in any case, means if the silo level is wrong you will have a pile of salt beside the silo.

The reason behind this is if the truck is overfilled – especially with a semitrailer which is unstable in such situation – it cannot be driven in public roads.

Our solution is a complete solution with a local display, damped to get a stable level, integrated in the local ASFINAG control system to get an overview of the salt levels.

The system has an **EchoTREK STD-33J-4** with a display unit in it what has been working without any problems for 2 years, and hopefully they will be used in some of the other hundreds of salt silos in Austria.

Harald Göth – CEO – Göth Solutions Gmbh

COMPLEX INSTRUMENTATION FOR SOLVENT STORAGE TANKS

Multiplex Engineering Ltd. is based in *Drogheda*, on the east coast of Ireland, 55 km (35 mi) north of *Dublin*. We specialize in the supply of instrumentation, process automation equipment and steam valves, plus we have been representing **NIVELCO** and its products since 2007 throughout the island of Ireland. We stock hundreds of "off the shelf" items in order to respond to customer needs as fast as possible and minimize their plant down time. Amongst our many services we provide replacements that can usually be delivered immediately from our extensive replacement stocks. We have an excellent reputation in Irish industry including the Power, Water / Wastewater, Dairy, Brewing, Chemical and Pharmaceutical sectors.

This application case study describes an instrumentation project for 6 newly installed chemical storage tanks that needed to be continuously measured with a high level alarm indication and completed with a complex controlling system.

Our customer, Soltec (Ireland) Ltd. is a hazardous waste recycling company that specialises in the recovery of environmentally hazardous waste materials. Their plant is located in Mullingar, 80 km (50 mi) west of Dublin. The solvent storage tanks are located outside the main building. They are horizontal cylindrical tanks and are regarded as ATEX, hazardous environment, therefore all the elements of the measurement system must be intrinsically safe versions. Amongst the wide product portfolio of **NIVELCO** we could choose all the devices needed for creating the complex measuring and the related controlling system that meets all requirements.

THE INSTALLED DEVICES ARE THE FOLLOWING:

- **MicroTREK HTA-430-8 Ex** (6 units)
- **UNICONT PGK-301-A Ex** (6 units)
- **UNICONT PMG-411-1** (6 units)
- **NIVOSWITCH RCM-401-8 Ex** (6 units)
- **UNICONT PKK-312-8 Ex** (6 units)
- **NIPOWER PPK-331-1** (4 units)

The **MicroTREK HTA-430-8 Ex** guided wave radar level transmitters have 3 m (10 ft) coaxial rod probes and are manufactured with special FFKM sealing. These transmitters are connected to **UNICONT PMG-411-1** universal controllers via **UNICONT PGK-301-A Ex** type intrinsically safe isolator / power supply modules.

The **UNICONT PGK** modules galvanically isolate the analogue 4 – 20 mA current signals and transmit to the **UNICONT PMG** units. These controllers display the measurement data in the central control room. They also monitor the measured level and control a solenoid valve through the relay outputs allowing the tanks to be filled and close the valve when set point is achieved. Besides the continuous measurement, mini compact **NIVOSWITCH RCM-401-8 Ex** vibrating fork level switches perform additional overfill protection. The level switches are powered through **UNICONT PKK 312 8 Ex** type current controlled switch modules which isolate the output signals of the vibrating forks. The switching signal of the top mounted units will energise a high level strobe and indicator which must be acknowledged by the personnel in the event of a high level event in the tank. The **PGK-301** and the **PKK-312** isolator modules are powered with 24 V DC voltage by **NIPOWER PPK-331-1** power supply modules. Space on bottom right of face of panel today is blank providing available space for two more panel instruments. Our customer intends expanding to 8 tanks in the future with the similar **NIVELCO** instrumentation and this space will allow for two more tank controls to be installed and commissioned by Multiplex Engineering Ltd.

Declan Coughlan – CEO – Multiplex Engineering Ltd.

LEVEL MEASUREMENT OF SULPHURIC ACID

MICROTREK LEVEL TRANSMITTERS IN THE CHEMICAL PLANT

One of the most well known and widely used acids is undoubtedly the sulphuric acid (H_2SO_2). It is one of the most important commodity chemicals in the Globe for its huge utilization in various industries like chemical, pharmaceutical, textile, petroleum, water, plastics and many more.

There are various ways how to manufacture H_2SO_2 and our customer as one of the major producers of chemicals in the *Czech Republic* uses the so-called contact manufacturing process. The final product of this contact process is oleum ($H_2S_2O_7$), also known as fuming sulfuric

acid which is a colourless, odourless and high density acid which is fuming at room temperature. This chemical is actually the key element of the manufacturing process because the concentrated sulphuric acid is produced when oleum is diluted with water.

NIVELCO Bohemia was asked to suggest a continuous level measurement solution for the mixing tank where oleum is diluted with water. The conditions in the tank were very challenging. There is the very aggressive atmosphere with strong fumes added with level fluctuations and not to mention the high humidity. The tank shape is cylindrical with more than 12 m (40 ft) diameter and 12 m (40 ft) height. Despite **NIVELCO**'s wide portfolio of continuous level transmitters, there are only several methods to be suited in such case.

Considering the aggressive atmosphere, the selected transmitter should be well protected against aggressive fumes and also should be able to measure reliably and with high accuracy in this harsh environment. Our choice was to use **MicroTREK** Guided Wave Radar level transmitter with full PFA/FEP coating including probe and flange.

THE DETAILED TECHNICAL SPECIFICATIONS OF THE SELECTED MICROTREK HBM-513-4 TYPE

- 2-wire guided microwave radar level transmitter with plastic coated flexible cable probe
- Ø4 mm (0.15 inch) diameter 1.4401 stainless steel cable with full FEP coating
- Cable counterweight with PFA coating
- Probe length: 13 m (42.5 ft)
- Housing material: plastic (PBT)
- Power supply: 18 – 35 V DC
- Local indicator: SAP-300 graphical plug-in LCD display
- Output: 4 – 20 mA + HART®
- Process connection: DN50 PN25 flange with PFA coated wetted parts
- Ingress protection: IP67
- Operating temperature: -30 °C … +90 °C (-22 °F … +194 °F)
- Operating pressure: max. 16 bar g (232 psi g)

The **MicroTREK** level transmitters based on the TDR (Time Domain Reflectometry) principle are excellent choices for such chemical applications since this technology is less sensitive on fumes and vapours. The units are also perfectly protected against any chemical reaction because all parts are covered with PFA/FEP coating providing long-term reliable level measurement. Our customer was satisfied with our solution and services and **NIVELCO** has once again proved its high quality products and customer orientated services.

Karel Ševčík – Sales Engineer – NIVELCO Bohemia s.r.o.

CARBON DISULPHIDE STORAGE

Carbon disulphide (CS_2) is heavy colourless liquid with an offensive odour, capable of ignition. Its low flash point (-43 °C, -45,4 °F), its wide explosive range in air (1.3 to 50%), boiling point is 46 °C (114,8 °F) & its ignition temperature is about 102 °C (215,6 °F) make it a particularly explosive & hazardous substance. It is volatile at ordinary temperature. It is however inert to most of the metals, ceramics, glass & it is completely stable in steel vessels.

The instrumentation task for **NIVELCO** Instruments India Pvt. Ltd. was Interface Level Measurement for CS_2 storage tank at Grasim Sellulosic Division (Aditya Birla Group), *Vilayat, Gujarat; India*. Requirement from the client was for Level Transmitter for 2 storage tanks of CS_2 and the height of each tank was 9450 mm (31 ft).

STORAGE OF CS_2

Carbon disulphide is generally stored under water in tanks, as it is heavier than water [density: 1.539 g/cm³ (-186 °C) (1537 oz/ft³, -303 °F), 1.2927 g/cm³ (0 °C) (1291 oz/ft³, 32 °F), 1.266 g/cm³ (25 °C) (1264 oz/ft³, 77 °F)] as well as insoluble in water at normal temperature. It is insensitive to the shock so long as no oxygen is present, Vapors are readily ignited, and the heat of a common light bulb may suffice. Therefore, except when in original containers in small quantities, it should be kept blanketed with inert gas or water at all the times for the storage of large quantities in vessels or tanks.

CRITICALITY IN LEVEL MEASUREMENT

CS_2 is so reactive that it has to be stored under a layer of water to prevent it from igniting, and the level of the interface between the water and carbon disulphide requires constant monitoring.

The conventional level instruments cannot be considered for this application as it is interface level measurement.

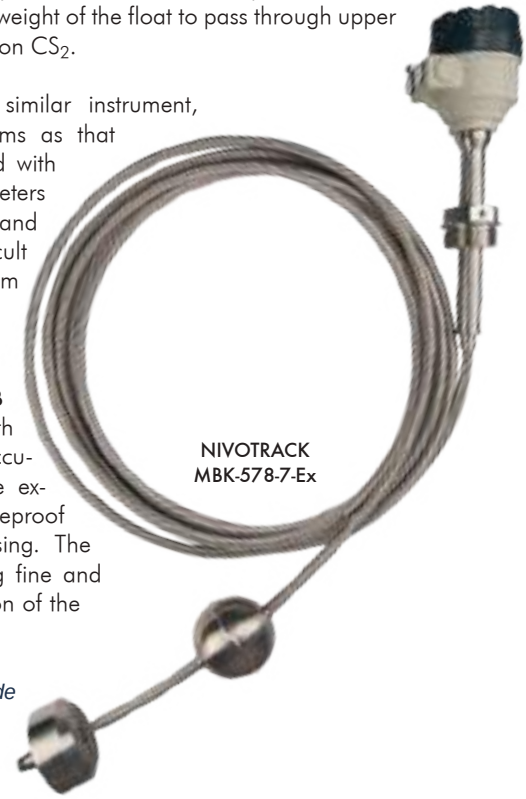
Generally for interface level measurement conventionally Displacer Type Level Transmitter, Capacitance Level Transmitter (limited use) were used or lately Guided Wave Radars (GWR) are used. But all these transmitters could not be applied for various reasons. E.g. Displacer type could not be considered due to tank height as well as practical difficulty in the installation. Capacitance could not be considered because it was difficult to follow calibration procedure practically. While in case of GWR, the application was tricky as the water dielectric constant is approx. 80 while that of CS_2 is about only 2.6. Hence for top mounting installations GWR is not suitable for this application as water is on top of carbon disulphide.

NIVOTRACK WITH CABLE EXTENDED PROBE

The Magnetostrictive Level Transmitter is most suitable instrument in this application as the density difference of both the liquids is considerable to calculate the desired weight of the float to pass through upper layer of water and float on CS_2.

The client was using similar instrument, but was facing problems as that instrument was supplied with rigid electrode of 9.5 meters (31 feet) of the length and practically was very difficult to install on the tank from the top.

Hence we suggested **NIVOTRACK MBK-595-B Ex** level transmitter with 0.1 mm (0,004 inch)accuracy option, with cable extended probe and flameproof (Ex d) aluminium housing. The instruments are working fine and reliably to the satisfaction of the client.



NIVOTRACK
MBK-578-7-Ex

Shrikrishna N. Deshpande – Managing Director – NIVELCO India Pvt. Ltd.

NIVELCO INSTRUMENTS IN THE ISRAELI PAINT FACTORY

NIVELCO IN ISRAEL, REPRESENTED BY TECHNOMAD

Technomad Industrial Instruments and Control Ltd. was founded in 1979 and it exclusively represents in Israel over 20 leading foreign suppliers in the sector of process automation, control and measurement. The company specializes in providing services and supplying measuring and control instruments for the process industry, controlled production facilities, chemical industry, water/wastewater industry, laboratories, research institutes and bio-pharma. Technomad is a private company owned by Adi Yarkoni and Shmuel Shlos, who are active General Managers of the company. Our team includes eight instruments and control experts.Technomad represents **NIVELCO** in Israel since 2010 and successfully marketing **NIVELCO**'s products across the Israeli market.

NIRLAT PAINT FACTORY INSTRUMENTATION PROJECT

Nirlat is one of the largest and leading Israeli industrial companies specializes in the development, manufacture and marketing of construction paint, decorative paint, powder coatings for exterior and interior use, for wood and metal, surface preparation compounds and sealants.

Nirlat has two main manufacturing and distribution sites – in *Kibbutz Nir-Oz* and in *Netanya* as well as a unique service center for paint consultation and inspiration Design Center. The company employs over 400 people.

Nowadays, as part of Israel south region development, Nirlat's factory is replacing old production lines with new ones. As part of the ongoing projects, all silos and tanks that uses for both raw materials and finish products, has been replaced with new ones including all level transmitters & switches.

NIVELCO INSTRUMENTS SUPPLIED:

- **EasyTREK SCD-34J-4** – 4 units
- **PiloTREK WPM-140-8 Ex** – 12 units
- **NIVOCONT RKH-502-5 Ex** – 12 units
- **NIVOCONT RKR-510-5 Ex** – 4 units
- **NIVOSWITCH RCM-406-9 Ex** – 8 units
- **NIVOCAP CKV-115-5 Ex** – 4 units
- **NIVOSWITCH RCM-401-4** – 2 units
- **NIVOSWITCH RCM-401-3** – 4 units

Barak Paz – Instrumentation and Control Practical Engineer – Technomad Ltd.

FUEL STATION LEVEL MEASUREMENT SYSTEM WITH NIVISION

NIVELCO has been present in Australia for more than a decade and the sales of level measurement instruments have been continuously increasing during these years. Year 2009 is another corner stone because our distributor in co-operation with a local oil industry instrument company offers and installs complex **NIVELCO** level measurement systems with great results.

MicroTREK, the guided microwave level transmitter from Nivelco is a highly popular solution world wide for the level measurement of various fuels. Level measurement with ±5mm accuracy, built in linearization table and long-term reliable operation are the key elements of the success. Display of ullage as well as the volume of the fuels is a requirement at Australian fuel stations. With the help of **MultiCONT** multi-channel controller connected to the **MicroTREKs** one can display simultaneously the measured level, the measured distance, the calculated volume and ullage.

Furthermore, 4 – 20 mA current output and relays can be assigned to every measured and calculated value. The RS485 output of the **MultiCONT** allows the querying of measured data by a PC which together with **NIVELCO**'s **NIVISION** process visualization software results in the implementation of a complex but flexible and transparent level visualization and data storage system.

NIVISION software continuously displays the current level in the tanks in real time. Moreover the screen shows numerically the level, the volume, the distance and the ullage in units defined by the user and also the level of fuel in percentage. The program stores the measured and calculated values of every tank in a database in a time frame defined by the user.

The stored data can be easily exported to an Excel file or displayed in a trend-window for analysis. Sound and visual signals can be linked to any alarm level and all alarm events are stored in a log file.

Australia with its area of 7 741 220 km^2 is the sixth largest country of the world. Probably this is why the option of **NIVISION's** web access is especially attractive. The process visualization software is available in a version that allows the user to have access to a running **NIVISION** project with any web browser over the Internet if the host computer is connected to the web.

You can connect several **NIVISION** projects into a network and access summarized data of several sites from any corner of the world. During the second half of the year 10 complete systems were sold on the remote continent in different configurations.

Based on the experience and feedback so far it is sure that the **NIVELCO's** software solution for a level measurement and visualization system can be expecting growing interest.

THE COMPONENTS OF THE SYSTEM:

- Ex-version **MicroTREK** guided microwave level transmitter to measure fuel level
- Ex-version **MultiCONT** multi-channel controller for processing the HART® signals of the transmitters (with optional relay and current output for each channel)
- **NIVISION** process visualistaion software

Gábor Horváth – Export Sales Engineer – NIVELCO CO.

LEVEL CONTROL IN HAZARDOUS AREA USING EASYTREK

BRAZIL

MEASURING HIGHLY FLAMMABLE LIQUIDS IN BRAZIL

NIVELCO's representative in *Brazil*, NIVETEC Instrumentação e Controle recently won an instrumentation project in the petrochemical industry.

The high requirements about reliability and the hazardous environment needed very precise instrument selection. From the wide range of liquid type level measurement instruments from **NIVELCO's** product range the intrinsically safe approved **EasyTREK SP-300** series with IP68 rated plastic housing provided the most suitable choice for the level measurement task.

The level transmitters are installed in *Macaé*, which is located in the coast of the Atlantic Ocean, near Rio de Janeiro. Our customer needed a complete level monitoring system of the tanks providing possibility to control the input and output batch of the stored products automatically. First of all we requested the list of chemical products that were planned to be stored in the tanks. The products are: Toluene, Alcohol, Acetates, Turpentine, Varnish remover, all are highly flammable media.

The measurement task was to continuously monitor the level in 10 pcs outside lying cylindrical tanks where the highly flammable liquids are stored. The tanks are grouped in two groups, one 5-tank group is placed on the ground level, and the other 5-tank group is placed on top of the first 5 tanks. The tanks are made from carbon steel, the length of the tanks is 6 m (20 ft) and the diameter is about 2.5 m (8.2 ft).

The supplied ultrasonic level transmitters were the **EasyTREK SPB-370-8 Ex** with PVDF housing having 4 – 20 mA + HART® output. Prior to the installation two important questions should be answered really carefully. The first thing to be considered is the dead-zone of the **EasyTREK** transmitters which is 0.35 m (1.15 ft) in case of the **SP□ – 37□** type.

We suggested the customer to create a stand-off pipe with a length equal to the dead-zone of the transmitters to meet the requirements written in the user's manual of the **EasyTREK** which provides drawings for proper mounting and offer recommended values for the diameter of the stand-off pipe suitable for a specific height.

The second problem to be solved was the question of volume calculation. Unfortunately we had considerable volume differences when using the built-in tank dimension formula for the horizontal cylindrical tank. Therefore we had to choose another solution and filled the linearization table of the **EasyTREK** with the help of a calibration chart provided by the manufacturer of the tanks. The chart contains the level values assigned to the proper volume data. Using the 32-point linearization the demanded accurate volume calculation has been achieved.

All the **EasyTREK** transmitters' analogue 4 – 20 mA output signals are sent to a central PLC that monitors whether the tank was stocked with the right amount of chemical products. All the measurement data

is monitored on a supervisory screen as well as the level charts of inputs and outputs of the chemical products of each tank that are continuously logged.

Herculano Alvarez – Technical Consultant –
NIVETEC Instrumentação e Controle Ltda.

HIGH ACCURACY LEVEL MEASUREMENT OF LPG

Central European Gas Terminal Co. chose **NIVELCO** to conduct the instrumentation of their site, in the first phase starting with two vessels.

The trade of LPG is strictly regulated by excise law in Hungary. Excise tax is to be paid by the vendor after the sold LPG quantity. Before this development project the company, which is one of the largest LPG dealers in *Hungary*, paid excise tax after the incoming LPG quantity, and not after the effectively sold quantity of LPG. The main motivation behind their instrumentation project at the *Dunaalmás* site was to install measurement instruments that will precisely measure the outgoing LPG quantity.

The Hungarian Customs and Finance Guard (HCFG) is the supervisory body for excise tax. They only accept mass or volume values derived from level measurements validated by the NMI (National Metrology Institute of Hungary). The NMI validates level measurements if the accuracy of the measurement is higher than 2 mm (0.075 inch).
The level transmitters have an NMI test certificate as well as a custom laboratory calibration certificate. The accuracy of the level measurement is 1 mm.
The officers of the HCFG can read the measured value from the display on the electronic module. From the linearization table of the tank and the measured level value the volume can be determined, and from the temperature dependant density the mass of LPG in the tank can be accurately calculated.

The missing quantity is the basis for excise tax calculation. For high alarm indication vibrating forks have been installed.

PARAMETERS

Tanks: 2 lying cylindrical tanks above the ground with a total capacity of 10 m^3 (353 ft^3), Ø2.5 m (8.2 ft)

The nominal pressure of the stored LPG is 16 bar g (232 psi g). The effective pressure is lower, typically 12 – 14 bar in summer and 6 – 7 bar in winter. When pressure test is conducted the pressure is 21 bar g (305 psi g) for 5 minutes. Temperature values of the stored LPG: Ambient: winter -20 °C (-4 °F), summer +35 °C (95 °F). Specific gravity of the stored LPG: min. 0.51 g/cm^3 (510 oz/ft^3) The instruments are installed in hazardous environment.

INSTALLED INSTRUMENTS:

- **NIVOTRACK MBA-325-A Ex** magnetostrictive level transmitter (2 units)
- **THERMOCONT TBC-527-A Ex** temperature transmitter (2 units)
- **NIVOSWITCH RCM-406-8 Ex** vibrating fork level switch (2 units)
- **NIPRESS DRC-382-6 Ex** pressure transmitter (2 units)
- **NIPOWER PPK-331-1** power supply (2 units)

József Kaplonyi – Domestic Sales Engineer – NIVELCO CO.

NIVELCO INSTRUMENTS IN THE OIL INDUSTRY

Today's modern drilling technologies use special technologic liquid – for drilling of hydrocarbon wells – so-called drillingmud. This is usually a mixture of milled bentonite and water providing hydrostatic pressure to maintain the wellbore stability and help the drilling assembly to be brought in and out of the hole, or help the removing of excavated soil by making circulation. In the drilling fluid plant different quality, aged for average 24 hours drilling mud are produced with suitable thixotropic properties for different composition of soil structures. These materials were produced at the place of the drilling and after the usage they were transported to slurry deposits or let into an infiltration trench.

Rotary Drilling Co. decided to phase in new German model technologies, where producing and processing of drilling mud are not performed at the place of the drilling, but in a site for this special purpose to provide higher efficiency for this technology, including regeneration – re-adjusting the properties – of drilling fluid.
In addition to these advantages, the used drilling mud does not contain explosive components, when got back to the site, so Ex-technology or application of Ex approved instruments is not necessary.

ON THE SITE OF THE INDUSTRIAL PARK IN ALGYŐ HAS BEEN ESTABLISHED:

- 2000 m^3 containers;
- 20 m^3/h saltwater filtering;
- 4 m^3/h capacity chemical separation technology drilling fluid plant;
- 17 pieces of 120 m^3 temporary tanks;
- 20 m^3, shared 20+10 m^3 mixing tanks.

The outside tank-park contains different quality, density, or diverse doped mud. Level transmitters and switches control the pumps through the process automation system and provide information for the operators, who can interrupt the processes. **NIVELCO's EchoTREK SEP-325** ultrasonic level transmitters were installed for level metering of the tanks. These units are 2-wire, loop powered versions with HART® communication, working from 24 V DC. Measurement of the tanks of 15 m (50 ft) height with a relatively small diameter is very difficult, so accurate installation of the ultrasonic sensor and specialized programming was necessary.
4 – 20 mA signals of the transmitters are processed by a PLC system. The data are recorded and used for making trends following the production and the procession of drilling mud. The system generates maximum and minimum signals from the output data to control the motored cut-off valve in the top of the tank and the pumps. **NIVELCO's EchoTREK SEP-380-2** ultrasonic level transmitters were installed in the centrifugal and the mixer tanks.

Taking into consideration the heavier foaming occurred by the stronger mixing, one mixer tank was equipped with **MicroTREK HTR-425** microwave level transmitter.
The double chambered **NIVOFLOAT NWP-110** float level switches sense the minimum and the maximum level in the top and the bottom of all the 17 tanks. They are applied for fail-safe indication. As they indicate In the site of the tank park rainwater is collected to underground tanks. Rainwater tanks are instrumented with **NIVOSWITCH RCM-400-3** vibration fork level switches. Emptying of the rainwater tanks are performed by hand-intervention based on the signals of the level switches. The whole tank park system is controlled by VISION process visualizing system.

Ákos Noll – Domestic Sales Engineer – NIVELCO CO.

NIVELCO TRANSMITTERS IN GAS STATIONS

The stock management of *Nigeria*'s largest oil retailer has been monitored on-line thanks to a Hungarian development, a complex remote object-monitoring system. This solution was born from the close cooperation of two company groups – Lambda-Com Kft. and **NIVELCO Process Control Co.** – which is able to provide continuous and accurate level monitoring. In addition to this the system facilitates the more efficient stock management and the organization of the fuel-delivery. The most important advantage of the remote monitoring system is that fuel losses, such as leakages or possible attempts of unauthorized takeouts can be detected immediately from any point of the world. **NIVELCO** and Lambda-Com started the project with the cooperation of the exclusive Nigerian distributor of **NIVELCO**, Smartflow Technologies Ltd.

OANDO, the largest oil retailer of Nigeria tests the monitoring service at 10 fuel plants in the framework of the pilot project. Expanding the system to the whole network with over 400 stations throughout the African country is among the future plans of OANDO.
The operation of the complex service – developed by the two Hungarian companies – is based on the measured levels of the fuel storage tanks equipped by suitable **NIVELCO** level transmitters.

Thanks to Lambda-Com's remote object-monitoring solution the measurement data are continuously monitored on-line and can be stored at the headquarters of the customer. This way the oil company can receive more accurate information – than ever before – about the fuel amount in each station. Moreover the system provides information about when to fill the tanks to minimize the costs and time loss. Now the system is able to handle data coming from hundreds of petrol stations and fuel plants thanks to the applied innovative technology. The larger is the network of the stations connected into the on-line system, the more is the remarkable cost-savings for the client oil company achieved by the reasonable operation. Level measurement data of the **NIVOTRACK** magnetostrictive transmitters are transmitted to a central management server with the help of special software. The system prevents possible stealing attempts which are unfortunately still frequent in Nigeria as well leakages resulting serious losses can be detected immediately.

The custom development device, called NivEye uses GSM/GPRS technology to provide up-to-date real-time information 24 hours a day about the measured levels of **NIVOTRACK** transmitters. Data are traceable from all over the world through a simple browser, without the need of any installed special software.

TO ACHIEVE THE FINAL RESULT, THE FOLLOWING REQUIREMENTS SHOULD BE MET:

- Accurate and reliable level measurement:
  The **NIVOTRACK** magnetostrictive transmitters are suitable for custody transfer measure-ments. The linearity of the 0.1 mm high-resolution devices is only 0.25 mm in the total range. Temperature changes or any gas layer above the liquid does not affect the proper level measurement. Ex ia intrinsically safe versions can be used in ATEX explosion proof zones.
- Reliable and continuous data transmission:
  The level transmitters are HART® communication capable and they transmit digital data to the **MultiCONT** multichannel process controller and display unit. The digital communication provides that data accuracy of the high-resolution measurement is not limited by analogue current output.
  The communication between **MultiCONT** and the GSM/GPRS module is performed on RS485 serial line. The GSM/GPRS modem is embedded into a complex electronics, so data loss cannot happen even in case of any connection loss between the gas station and the server, or any possible failure of the APN network, because measured data are stored on the internal memory of the GSM/GPRS module until the reconnection. When the connection is on-line, data will be sent immediately to the remote server.
- Transp. user interface, continuous availability:
  Lambda-Com has decades of experience on the management and maintenance of large databases. The 98% availability and safety backup are provided with redundant server network as well with efficient archiving protocols.

Dolapo Adeyeye – Managing Director
– Smartflow Technologies Ltd.

FUEL LEVEL MEASUREMENT WITH MAGNETOSTRICTIVE TRANSMITTERS

ROMANIA

The company named BRILLIANT establishes and operates gasoline stations in *Romania*, in the eastern part of the *Moldva* region. They are intended in the establishment of 22 new (small, container type) gasoline stations in the near future and they have been searching for a suitable level transmitter on the market.

The essential requirement for the operation of a gasoline station is a certified high-precision measurement system which should be approved for custody transfer measurements meeting the regulations of the Romanian Bureau of Legal Metrology and Customs Administration. Many companies were competing in the tender with their own products where finally **NIVELCO Tehnica Masurarii** won with the offered high-precision, highly reliable and cost-effective **NIVOTRACK M-500** series magnetostrictive level transmitters.

NIVELCO T.M. was entrusted with the commissioning along with the delivery of the transmitters. In 2012 we solved the instrumentation of gasoline and diesel oil tanks in two stations.

In accordance to the regulations of the Romanian Bureau of Legal Metrology and Customs Administration the measured tanks should have calibration certifications. This requirement can be met if the level measurement instruments are able to perform volume calculation.

The high-precision **NIVOTRACK** magnetostrictive transmitters are suitable for the custody transfer measurements and have linearization table in order to perform volume calculation.

During the installation we programmed the VMT table of the transmitters with the level – volume point pairs of the calibration certifications.

In the year 2013, BRILLIANT has ordered the instrumentation for two further gasoline stations.

Unfortunately the Romanian Bureau of Legal Metrology and Customs Administration created more strict regulations in 2013 and according to this all instruments shall be approved by the Romanian Authority which are involved in any kind of custody transfer measurement. Since the **NIVOTRACK** magnetostrictive level transmitters have the internationally accepted OIML R85 (International Organization for Legal Metrology) certification which attests that an equipment is complying with the relevant international recommendations so we had a very easy task to receive the local certification in the related bodies of the Romanian Authorities.

We are very looking forward for the further gasoline and diesel oil tanks to be established in the near future where we will facing with instrumentation tasks to be solved successfully, resulting maximal satisfaction to our customer.

Antal Máthé – Technical Consultant – NIVELCO T.M. SRL

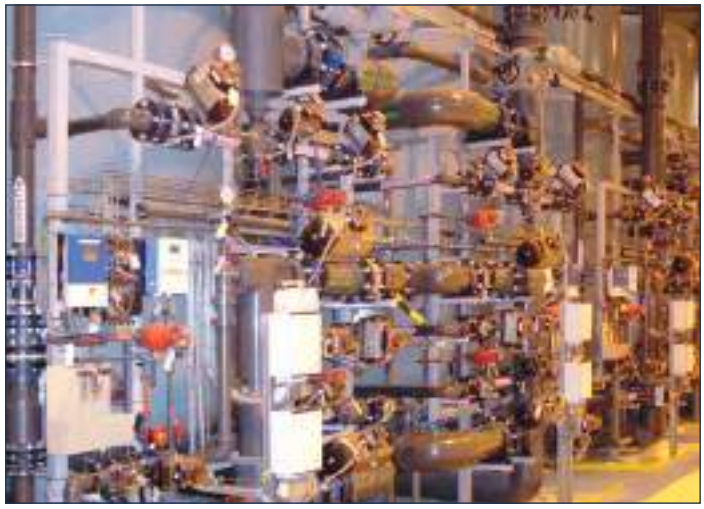
INSTRUMENTATION FOR WATER TREATMENT IN OIL REFINERY

SLOVAKIA

Natural waters in most cases are not suitable for communal or industrial applications. The parameters of these waters are influenced by the organic and non-organic components as well as the mineral content.

NIVELCO has a long lasting relationship with Hidrofilt Ltd. This company is known as a specialist in water treatment technologies, they have great experience in system design, production and installation. The custom designed systems are constructed according to the properties of the local water resources as well as the customers' specific needs. Devices in their technology are mechanical filters, ion exchange columns, reverse osmosis filters (RO), electro deionisation devices (EDI) and accessories and supplementary instruments.

These devices perform reliably only under controlled pressure, temperature and flow conditions. For this reason automated supervision of the systems is a must.



The monitoring of these parameters is done by **NIVELCO**'s instruments. In the bigger systems intelligent transmitters are applied to measure physical and electro-chemical parameters.

The digital HART® signal superposed on the 4 – 20 mA current loop allows the users to program the devices or to set any service parameters remotely with the use of the appropriate software.

For temperature and pressure measurement **THERMOCONT T-500** and **NIVOPRESS D-400** type transmitters are installed respectively. Supplementing these technologies are other storage tanks usually containing raw or purified water. The transmitters of **EchoTREK ST-300** family are applied for the level measurement in these tanks. To ensure reliable operation of the water treatment technologies from time to time chemical treatment of the system is necessary.

Hidrofilt designs fully automated systems, so it is important to continuously monitor the level in the tanks containing various chemicals. The measurement principle most suitable for a given application depends on the kind of chemical stored and its properties. For mediums likely to produce foam usually **NIVOTRACK M-500** or **MicroTREK H-400** type instruments are applied.

According to regulations chemical tanks must be equipped with both high and low level switches. This function is realised with **RF-400** type vibrating fork switches.

The quality of high purity waters can be tested by measuring water conductivity. **AnaCONT LCK** compact conductivity transmitters are used for this purpose. To check acidity or alkalinity of the fluids we offer **AnaCONT LEP** pH transmitters. In this project was installed nearly 200 pcs different kind of **NIVELCO** instruments.

Ákos Noll – Domestic Sales Engineer – NIVELCO CO.

MICROTREK TRANSMITTERS IN THE OIL INDUSTRY

SPAIN

LEVEL MEASUREMENT IN OIL STORAGE TANKS WITH GUIDED MICROWAVE RADARS

TERMINALES CANARIOS, S. L. is a company dedicated to provide logistics services of reception, storage and delivery of fuels and lubricants in the *Canary Islands, Spain* since 1986. The company 50 – 50% owned by BP Oil España S.A. & Repsol Comercial de Productos Petrolíferos S.A., two of the most important and reputable companies in the energy sector.

The mission of the company is to provide a specialized logistics services with an integral approach and the highest levels of safety, quality, environmental respect and efficiency. The fuels and lubricants are destined to aviation, maritime, industrial and automotive sectors. Lubricant is essential to extending the life of any machinery, and proper lubricant storage is critical to maintaining a clean and healthy fluid. One of the key elements in the inspection and maintenance is checking and maintaining proper fluid levels in the supply tanks.

Thanks to IBERFLUID Instruments, **NIVELCO's** Spanish distributor company, the high reliability **MicroTREK** Guided Wave Radar level transmitters are responsible for the level monitoring in the lubricants storage tanks at two sites of TERMINALES CANARIOS. The Santa Cruz de Tenerife port terminal has modern installations and equipment including oil storage tank farm with 100 000 m^3 (about 26.5 million US gallon) capacity, lubricants storage tanks and laboratory for oil products related tests.

There are eight 4.2 m (13.8 ft) tall standing bulk lube storage tanks which are equipped with **MicroTREK HTT-405-4** and another one **NIVOTRACK MBK-525-8 Ex** magnetostrictive level transmitter is measuring the liquid level in the 2.5 m (8.2 ft) high laying cylindrical gasoline tanks.

In the other site in Gran Canaria international airport road tanker discharge facilities, oil storage tank farm and refuelling loading bay can be located with access to fuel hydrant system. There are also eight 4.2 m (13.8 ft) tall standing bulk lube storage tanks which are also measured with **MicroTREK HTT-405-4** units and another four 2.5 m (8.2 ft) high laying cylindrical gasoline tanks are measured with **MicroTREK HTT-403-4** and one similar oil tank is equipped with a **NIVOTRAK MBK-525-8 Ex** unit.

Every level transmitter is connected to **UNICONT PMM-513-1** universal display units at both sites, providing local displaying of the measurement data. This successful project is again a very good example showing that the expertise of IBERFLUID Instruments and the excellent instruments of **NIVELCO** complementing each other and able to create an efficient level measurement system.

Juan Manuel Quiroga Sanmartín – Sales Engineer – IBERFLUID Instruments s.a.

INSTRUMENTATION OF THE BASALT QUARRY

CZECH REPUBLIC

The *Germany* based *Basalt-Actien-Gesellschaft* group is a leading European company of grinded aggregate materials. Their Czech subsidiary, Basalt s.r.o is one of the major manufacturers in the field of construction aggregates in the *Czech Republic*.

They operate three quarries where mainly whinstone is mined. The most important site is located in the north-west region in *Merunice* city. This facility of 17 hectares has an annual production of 750 000 tonnes, the aggregates are mined there with modern technology and stored in the huge silos.
In the middle of the 90's **NIVELCO Bohemia** supplied 2-part **NIVOSONAR** ultrasonic system for 13 storage silos of various aggregates at Basalt s.r.o. However the harsh and highly dusty environment was not really ideal for proper level measurement, the ultrasonic system measured precisely and the units worked flawlessly since the installation, long after exceeding their life expectancy. The replacement of the old instruments was made only with precautionary purpose to avoid a possible costly operation failure or a worst case complete shutdown.
Since our customer has been very satisfied with **NIVELCO** ultrasonic system, there was no question about choosing new ultrasonic level transmitters from **NIVELCO**.

REQUIREMENTS FOR THE INSTRUMENTATION PROJECT:

- Replacement of 13 ultrasonic units for the 8 m (26 ft) high silos containing various aggregates
- Dual channel process controller and display units with MODBUS communication protocol
- Process visualization software

Considering the previous experiences and the local conditions, team of **NIVELCO** Bohemia offered the 4-wire high-efficiency **EasyTREK SCD** ultrasonic transmitters for solid materials with the special aimer joystick mounting.

The characteristics of the units, such as the 0.6 – 15 m (2 – 50 ft) measurement range and the 5° narrow beam angle was ideal for the application.

The perfect solution for the controlling and displaying task was the **MultiCONT** multichannel process controller with two input channels and optional RS485 output as per the requirements.
Through the RS485 line the **MultiCONT** use MODBUS RTU protocol to communicate with the PLC. The additional simple process visualization software was developed as a customised solution based on the customer demands.

THE INSTALLED INSTRUMENTS ARE THE FOLLOWING:

- **EasyTREK SCD-34J-4** (13 units)
- **MultiCONT PEW-22A-1** (7 units)

NIVELCO Bohemia is very proud on announcing again a successful application story thanks to the great reliability of **NIVELCO** manufactured ultrasonic level transmitters.
We know that good customer care is a key element for success in every field and we proved that we are able to provide smart and simple solutions for our customers.

Vojtěch Samec – Managing Director – NIVELCO Bohemia s.r.o.

SCREENING PLANT OF LIMESTONE

POLAND

NIVELCO's Polish distributor has supplied **EchoTREK STD-33J-1** – our flagship ultrasonic level transmitter for solids – to Nordalk, one of our customers in Miedzianka, for solving measurement tasks in a limestones screening plant in Poland.

After positive trials **NIVELCO** has delivered six pieces of such instruments which allow full automation of processes in the screening plant.

All signals from the level measuring **EchoTREK**-s go directly to central control and visualization room and help to optimize efficiency of screening without presence of employees in this highly dangerous and dusty environment. Mechanical and electrical installation was done by a contractor and **NIVELCO-Poland**'s specialists optimized and adjusted settings of the instruments.

APPLICATION

Limestone of different sizes are loaded directly from conveyor belts into 10 – 15 meters (33 – 50 feet) high bins and bunkers, in very dusty environment, among high acoustic noises and extremely strong vibrations from the screens and conveyors.

All delivered instruments work reliably and are credible source of information about level in bins. This allows the personnel to minimize time and number of operations required to control filling and emptying processes and what is very important, also helps to enhance work conditions and safety which ultimately means improved overall health of employees.

As a proof of perfectly satisfied customer, they have chosen **NIVELCO EchoTREK** instruments once again to handle level measurement in their raw lime-stone buffer tanks.

Dariusz Piszer – CEO – NIVELCO Poland Sp. z o.o.

KAOLIN PROCESSING PLANT

NIVELCO EASYTREK ULTRASONIC TRANSMITTER

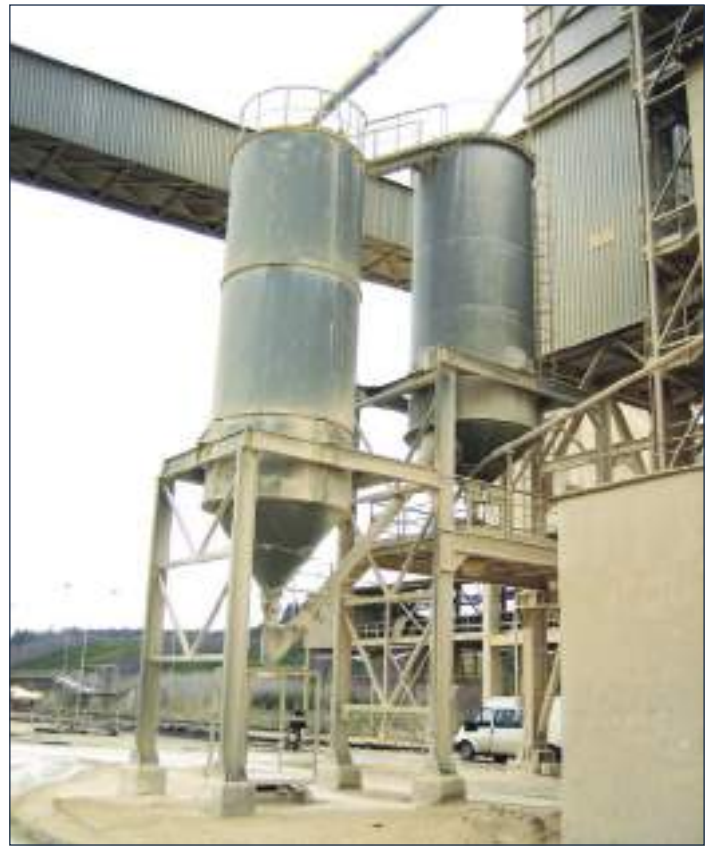
Kaolinite (kaolin or china clay) is a soft, earthy, usually white silicate clay mineral produced by the chemical weathering of aluminum silicate minerals like feldspar. Commercial grades of kaolin are supplied, and transported as dry powder, semi-dry noodle or as liquid slurry. Kaolin is mainly used in the production of paper, as its use ensures the gloss on some grades of coated paper. It is also added to gauze in medical applications to promote blood clotting.

Other uses include porcelain ceramics, toothpaste, cosmetics, skin creams, paint, insecticide sprays, treatment of stomach ailments, water and wastewater treatment, and as an additive to cement.

A major producer of Kaolin in the *Southeastern USA* was experiencing ongoing failure of a major competitor's ultrasonic level transmitters used to monitor slurry level in their filter vats.

The existing transmitters were failing due to moisture created from the vapors of the warm slurry, as well as the tight dimensions of the vats and the dirty, dusty environment from the powdery white Kaolin clay outside of the vats. Wanting to stay with the convenience and low cost of an ultrasonic transmitter, the customer contacted **NIVELCO USA** for a solution.

EasyTREK's rugged, remote mount, IP68 design along with the highly focused beam angle seemed to fit the customer's demanding application requirements. The customer decided to try an **EasyTREK** model **SPA-38N-4** on a trial basis, replacing the competition's transmitter.

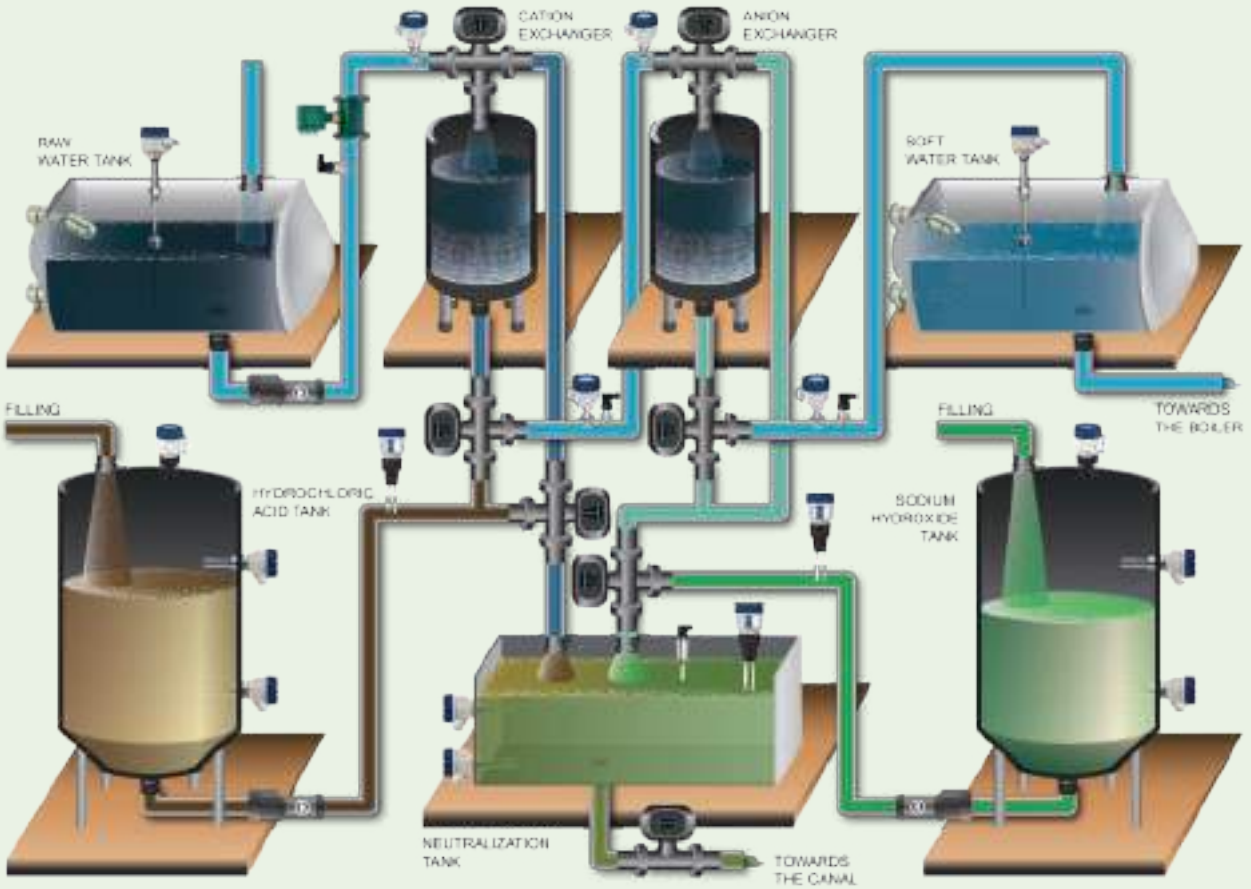


If the **EasyTREK** performed to expectation, then the customer would replace all existing ultrasonic transmitters at their plant.
The trial unit performed without any problems or issues, resulting in orders for level transmitter replacements on other vessels, with a request by the customer to stock this model for quick delivery for future orders.

The trial unit performed without any problems or issues, resulting in orders for level transmitter replacements on other vessels, with a request by the customer to stock this model for quick delivery for future orders.

Not only does this customer like the reliable performance of their EasyTREK, but they also like the ease of configuration using the **UNICOMM SAT-304-0** HART®-USB modem and EView2 software. Since the majority of the applications in their plant require the same transmitter configuration, the ability to save the configuration file and transfer to other **EasyTREK** transmitters is very popular with the customer.

Steve Henrikson – Sales Engineer – NIVELCO USA LLC



WATER SOFTENING (SOFTENED WATER PRODUCTION)

The received raw water from the wells contains calcium and magnesium salts, as well nitrates at ionic form. These materials can result deposits, which may be harmful for the process industrial equipments such as boilers, exchangers, so the water should be cleaned. The harmful salt ions can be removed by bonding them with suitable natural and synthetic ion-exchanger media, while hydrogen ion (cation exchanger) and hydroxyl ion (anion exchanger) are released at the same amount.

The raw water is flown through the two ion-exchangers which produce descaled (softened) water. The cation and anion exchangers have a given ion-exchanging capacity which became saturated during the process. To return to active state, the ion-exchanger media should be regenerated. The cation exchanger media are regenerated with hydrochloric acid (HCl), the anion exchanger media are regenerated with sodium hydroxide (NaOH). Regeneration materials are gathered into a common storage tank, then after a proper neutralization they are let into the canal system.

INSTRUMENTATION

RAW WATER AND SOFTENED WATER TANKS:

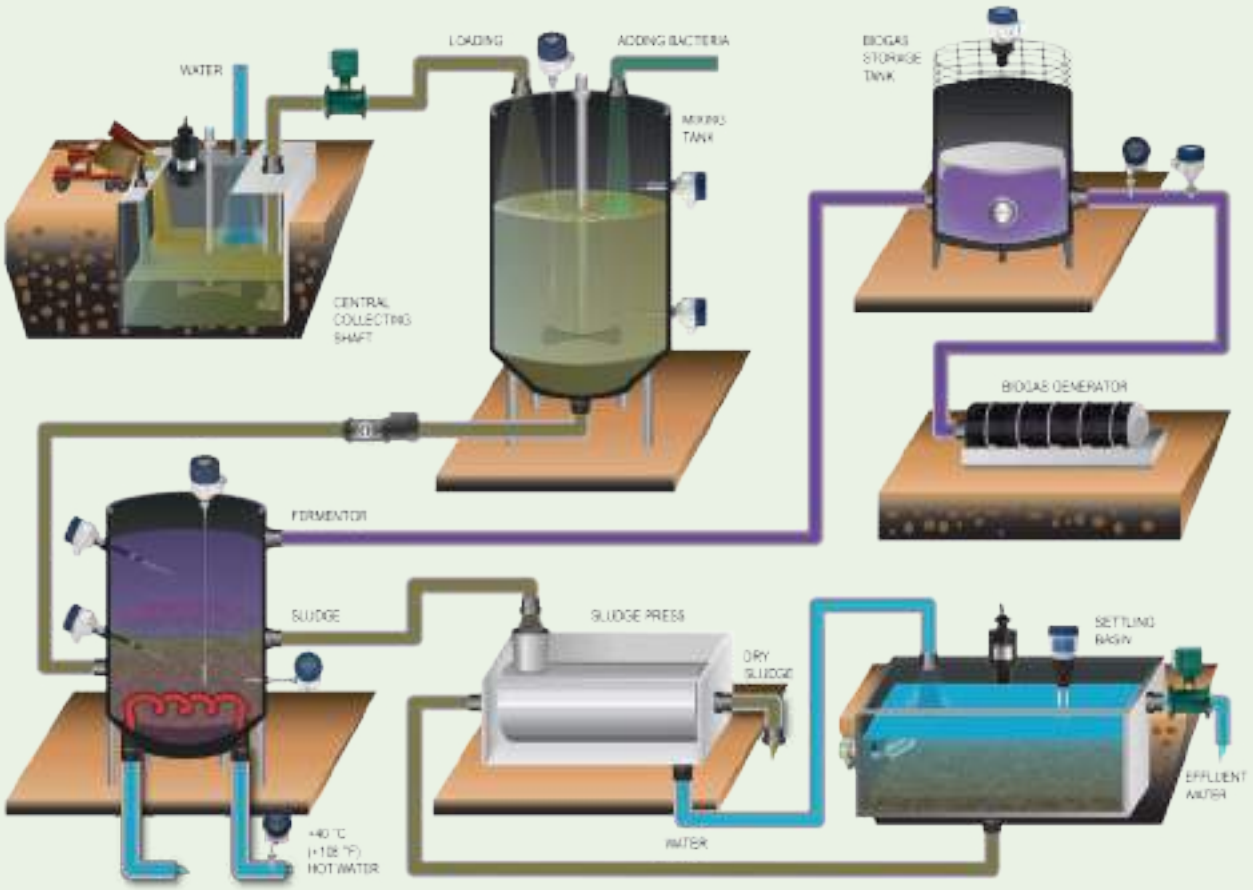
- Level measurements with **NIVOTRACK MTC-500-2** magnetostrictive level transmitters
- Low/High level indications with **NIVOMAG MKA-210-0** magnetic coupling level switches

HCl & NaOH STORAGE TANKS, NEUTRALIZATION TANK:

- Level measurements with **EchoTREK SEA-380-2** ultrasonic level transmitters
- Low/High level indications with **NIVOSWITCH RDM-400** plastic coated
- vibrating fork level switches
- pH measurements with **AnaCONT LEP-100-2** compact analytical transmitters

WATER SOFTENING PROCESS:

- **AnaCONT LCK-222-2** electric conductivity transmitter
- **NIVOPRESS DTE-500** hydrostatic pressure transmitter
- **ISOMAG** flow meters



CENTRAL COLLECTING SHAFT

Biogas can be obtained by anaerobic fermentation from organic biomass (commonly animal generated organic manure). The manure is collected in a closed shaft where it is diluted with water and mixed into liquid state to be pumped. Continuous level measurement is performed with **EasyTREK SPA-360** or **EasyTREK SPA-340** ultrasonic level transmitters. Flow metering of the liquid manure is done with ISOMAG electromagnetic flow meters.

MIXING AND FERMENTOR TANK

This mixture is pumped into a mixing tank where microorganisms are added which allows the fermentation biochemical process. In the fermentor tank biogas is produced and the remaining material is watered sludge. In both tank **MicroTREK HTN-400 Ex** series Guided Wave Radars are recommended for continuous level measurement. In the mixing tank **NIVOSWITCH RFM-400** series vibrating fork level switches are recommended for low / high fail safe indication and in the fermentor tank the level switching of the foam is done with **NIVOCAP CKV-100 E**x type units.

BIOGAS STORAGE TANK AND SETTLING BASIN

The biogas is transferred into the biogas storage tank and then burnt in the biogas generator. The level of the floating roof tank is measured with **EchoTREK SGB-300 Ex** type ultrasonic unit. The pressure of the biogas is measured with **NIVOPRESS DTF-500 Ex** type hydrostatic pressure transmitter. The process starting from the fermentor tank is entirely classified as hazardous (Ex) environment. The remaining sludge gets dehydrated and then dry sludge is transported from the plant. The water coming from the sludge press is pumped into a settling basin.

LEVEL SWITCHES IN THE COOLING SYSTEM OF TURBO GENERATORS

CZECH REPUBLIC

The **NIVOMAG** magnetic coupling level switch is a perfect choice for limit level measurement especially in harsh industrial applications.
Thanks to **NIVELCO Bohemia**, our Czech subsidiary company we can present a case study of a power industry application where the high-reliability **NIVOMAG** level switches are responsible for level monitoring of cooling liquid of turbo generators.
The operation specifications such as the up to 250 °C (482 °F) temperature and pressure up to 25 bar g (362 psi g), the SIL1 (Safety Integrity Level) approval and Ex atmosphere versions makes this unit required e.g. for energy industry. Mounting of **NIVOMAG** is available either from side or top of the tank. Also wide variety of process connections is offered including thread, square flange or DIN flanges made of steel or stainless steel.

For electricity produced in nuclear and heat power stations turbo generators with high power (more than 100 MW) are used. To cool such generators it is not possible to use standard air-based cooling system. The most demanding parameters of the medium used for cooling high power generators are low viscosity (ρ), high heat capacity (C) and high thermal conductivity (λ). For example hydrogen is a medium meeting the required parameters.

HYDROGEN USED FOR COOLING

To improve cooling efficiency, stator of generator is filled with gaseous hydrogen with pressure higher than in the surroundings. Both sides of the rotor shaft are sealed with labyrinth seal. Turbine oil flows in the system with higher pressure than hydrogen pressure inside and protects the leaking of gaseous hydrogen from the stator.
At the end of the process the turbine oil it is split up to two parts, the oil saturated with air and the oil saturated with hydrogen. These two media cannot be mixed because this will create dangerous explosive mixture. Therefore the oil from hydrogen side is directed to the vacuuming tank which is equipped by vacuuming pump.

This pump creates vacuum above the level surface and skims off hydrogen from oil. To monitor the emergency levels of oil two **NIVOMAG MKA-210-9 Ex** float level switches are used. The separated, magnetic coupling construction of the **NIVOMAG** level switch is really advantageous in order to avoid any leaking in the system.

ADVERSE HUMIDITY

The next adverse factor is humidity or more precisely the water in hydrogen inside the stator. This humidity devalues hydrogen content and may cause corrosion and arcing in the high voltage windings, which reduces lifetime of the generator.
For this reason a desiccant-based dryer is used.
The desiccant-based dryer – which was manufactured by our partner, called Servis-Energo – is installed in gas circulation loop and allows desiccation of water in hydrogen.
All parts of the dryer are made of stainless steel consisting of a tank with vaporizer, a refrigeration condensing unit and a water collector.
The water in hydrogen freezes on the cooling fins of vaporizer then after 23 hours of running the condensing unit switches off for one hour. The warm hydrogen melts the ice, which flows into water collector tank. The maximum level in water collector is controlled by **NIVOMAG MKA-210-9 Ex**.
NIVELCO Bohemia is very proud on announcing again a successful application story thanks to the great reliability of **NIVELCO** instruments. We know that good customer care is a key element for success at every time and we proved that we are able to provide smart and simple solution for our customers.

Vojtěch Samec – Managing Director – NIVELCO Bohemia s.r.o.

INSTRUMENTATION FOR HYDROELECTRIC POWER PLANT

LATVIA

The company **ZTF Lāsma** is a very important player in the industrial automation segment in *Latvia*. Our company is already more than 20 years old having even longer experience in this field. Our headquarters is located in the capital city *Riga* where our young and agile team is dealing with a wide variety of the industrial areas along with representing **NIVELCO** and its products for more than 10 years. The company has highly qualified employees which help not only to sell and produce the automation devices, but we are also able to provide the required knowledge, which is important for the customers.

Historically water in all of its forms is very important for Latvia. The seacoasts and the Daugava River, that splits it in two parts as transport ways, small rivers and lakes for food and nature. Also for economics it is important, because there are a lot of hydroelectric power plants, which produce the so-called "green energy". Lasma is also in this part of market with different kind of solutions to control these processes. The town of Bene is located in the western part of Latvia and there is the Auce River which is used in the local hydroelectric power plant.

THANKS TO LASMA THE INSTALLED MEASUREMENT EQUIP-MENTS ARE NIVELCO'S HYDROSTATIC SUBMERSIBLE LEVEL TRANSMITTERS:

- **NIVOPRESS NPD-42-05** – 1 unit
- **NIVOPRESS NPK-42-05** – 2 units
- **NIVOPRESS NAW-104** sewage adapter – 3 units

The **NIVOPRESS NPK-400** series level transmitters provide important river level and temperature information to the power plant. The units are connected to the central switchboard to control the equipments of the plant. Usually there are 3 sensors for one plant or turbine, because it depends on the water inlet channels.

The first sensor is installed in the upper part of the river, in front of the inlet filter – bars, to get the actual information about water level. The second sensor is placed right after the filter – bars, to get the actual information about the water level after the bars, to check if they are clean enough and the water can freely flow through them. This is also an important signal for operators at the switchboard to clean the filter – bars.

The third sensor is installed downstream to control the level of the river after the plant, to protect it from low or high level, which can destroy some flora and fauna. These three sensors together are like three "hands" for the PLC, to check the actual level and control the power plants' "heart" – turbines with generators and inlets sluice. The applied units have two-meter ranges and all of the units are equipped with **NAW-104** sewage adapters protecting the piezoresistive stainless steel membrane from the possible solid particles of the water. The probes are installed in plastic pipes, to protect them from some physical damages or ice in winter time. The incorporated temperature sensor in the **NIVOPRESS NPD** type unit is giving actual information about temperature in the river, which also in some cases is forwarded to general accounting system. This system is public and shows actual level and temperature for almost all of the biggest rivers in the country.

Mārtiņš Kāns– Automation Product Engineer – ZTF Lāsma

ULTRASONIC LEVEL TRANSMITTERS IN THE COAL BUNKERS

POLAND

Coal is very common material used in many branches of industry like power generation, coke production, chemical and many, many others. In some countries like in *Poland* black coal burn corresponds to majority of energy used by industry and households.

In a typical coal burned power plant most of coal is stored in outside stockpiles, from where it is transported with various methods for example by conveyor belt. Then the processed coal is finally loaded into coal bunkers as last step before grinding and burning. To keep proper amount of coal in the coal bunkers is critical for the flawless, safe and continuous power production. For this reason level measurement equipment used in coal bunkers have to ensure reliable and basically maintenance free operation preferably in non-contact manner.

Thanks to its exceptional construction and reliability **NIVELCO's EasyTREK SCD** is an ideal choice for these harsh applications.

Due to its construction there is no housing with connections above bunker which made installation easy and economical.

The **EasyTREK** is programmed via HART® protocol from PC or **MultiCONT** universal controller.

MAIN TASKS FOR EASYTREK LEVEL TRANSMITTERS:

- Ensure continuous supply of coal
- Prevent overfilling
- Prevent lack of coal supply to the coal pulverizer
- Guarantee proper layer of coal inside bunker to block eventual explosion in the grinder
- Observation of material movements

TYPICAL APPLICATION REQUIREMENT WHERE EASYTREK SCD IS USED:

- Height up to 15 m (50 ft)
- Often not regular shape
- Often sophisticated filling systems
- Dusty environments, high acoustic noises and strong vibrations

Result of proper match of requirements and superior **EasyTREK SCD** features is well over 100 units successfully installed and working flawlessly in last few years by **NIVELCO-Poland** Sp. z o.o.

Dariusz Piszer – CEO – NIVELCO Poland Sp. z o.o.

INSTRUMENTATION OF A BIOGAS PLANT

HUNGARY

Existing environmental regulations in *Hungary* require livestock farms to dispose of the manure produced in dedicated underground tanks. Since that is not a really efficient method, biogas plants are used throughout the European Union as the optimal solution for this task.

So Farmers Cooperative in Jászapáti made the decision to establish a biogas plant, and they won financial support from the European Union to realise this project. The biogas plant produces methane from the livestock manure which is burnt to power a gas-motor to generate electric energy.

The finished biogas production plant uses the neighbouring livestock litter and liquid manure, as well as corn-silage and other types of organic waste. Along with the generated electric energy the other useful by-product is the bio-manure, which can be used in the fields as compost, after phase-segmentation and treatment.

The actual biogas production is done in 3 fermentors, where anaerobic (in the absence of oxygen) digestion takes place. This controlled biological breakdown of the input materials into components is performed by bacteria. During this process primarily methane (CH_4) and carbon dioxide (CO_2) are released. Biogas fermentation technology requires many measurement tasks which should be controlled continuously.

BIOGAS TECHNOLOGY IS INSTRUMENTED BY THE FOLLOWING NIVELCO INSTRUMENTS:

- The input livestock manure is stored in a pre-silo, where it is turned into liquid manure by adding water. The level in this silo is measured by an **EasyTREK SPA-360-4** integrated ultrasonic transmitter. The instrument is IP68 protected to protect it from accidental submersion.
- This liquidised manure is transferred into the fermentors.
- Temperature measurement of the digestion process is monitored by **THERMOCONT TTJ-521-6 Ex** type intrinsically safe temperature transmitters, which incorporate a Pt100 sensor.
- Process pressure is measured by a **NIVOPRESS DTF-501-6 Ex** hydrostatic pressure transmitter.
- Solving the high level fail-safe alarm indication of the fermentors created a quite rare application for our capacitive level transmitter. Our experts offered a **NIVOCAP CTR-206-6 Ex** mounted unusually in the horizontal position. With this special solution programmed properly for this application – eliminating the relative dielectric constant of the air in the tank – foam detection was successful in the fermentors.
- After the fermentation process the remaining sludge is dewatered in a screw press, and the water is let into the drain after degassing. Level measurement of this degassing tank is done by a standard vertically mounted **NIVOCAP CTR-206-6 Ex** capacitive level transmitter.

The completed biogas plant demonstrated its economical and efficient operation during the first trials. The biogas plant is able to generate 3.2 MWh of electric energy from the manure produced in only one day at the farm. In this way the farm can cover the running costs of the plant, while the amount of dry sludge generated is less than one cubic meter.

After this successful project, **NIVELCO** looks forward to the future possibilities of cooperation on similar investments for complete biogas instrumentation, particularly for efficient renewable energy production.

József Kaplonyi – Domestic Sales Engineer – NIVELCO CO.

USE OF NUCLEAR POWER NIVOMAG LEVEL SWITCHES

CZECH REPUBLIC

NIVOMAG LEVEL SWITCHES IN A CZECH NUCLEAR POWER PLANT

One of the main sources of electricity (35%) in the *Czech Republic* is produced in two nuclear power plants in *Dukovany* and *Temelín*. Both plants are owned and operated by the state-owned company ČEZ which is the biggest producer of electricity in Czech Republic. ČEZ, a.s. employs more than 26 000 employees and has market capitalisation of 8 billion EUR. Company as big as ČEZ, heavily relies on cooperation with outsourcing companies that have more expertise in various fields.

For the new investment in point level measurement of storage tanks, ČEZ, a.s. chose to work with system integrator OT Energy Services a.s. that contacted our company **NIVELCO Bohemia** s.r.o. as one of the possible suppliers.
After the initial offering technical details were discussed as well as pricing, which resulted in **NIVELCO Bohemia** became official supplier for this project. For storage tanks with oil, diesel and water located in Temelín power plant, we will supply over 100x **NIVOMAG** magnetic coupling level switches in the coming months in various versions, including Ex types. **NIVOMAG** switches are among the most reliable point-level indicators in our portfolio due to their simple construction and functioning without external power supply.

Besides the amount and importance of the customer, interesting part of this project was that some level switches were to be used in a technology, where seismic endurance in category 1a is required. Seismic activity in power plant area is continuously monitored and regularly checked by the International Atomic Energy Agency (IAEA) despite *Temelín* is situated on the oldest and strongest part of geological unit called the Bohemian Massif (Český masiv).

To fulfil the strict requirements of seismic endurance in category 1a, **NIVOMAG** had to be certified at Military Technical Institute (MTI), state enterprise established by the Ministry of Defence of the Czech Republic. Certification took place in the branch of MTI, Military Technical Institute of Ground Forces (MTIGF), test room of special measurements, stationed in *Vyškov* city.

Testing of **NIVOMAG** was done on a special vibronic machine that can simulate effects of seismic activity. Different frequencies in the range between 1 – 100 Hz with constant amplitude were used together with different axes.

Tools, methods and measurement results were recorded in form of a protocol that in case of meeting all requirements, serves as a certificate granting seismic endurance. **NIVOMAG** succeeded in all the tests and has been approved for using in applications where seismic category 1a is needed. Hereby, we would like to thank to employees of ČEZ, a.s. for providing the needed consultations and to the employees of MTIGF for swift process of certification.

Karel Ševčík – Sales Engineer – NIVELCO Bohemia s.r.o.

MICROTREK TRANSMITTERS IN ESTONIA

STANDEL, THE ESTONIAN DISTRIBUTOR OF NIVELCO

The main business for Standel AS is selling control and automation products and representing respected manufacturers from these industry areas. We are the exclusive distributor of **NIVELCO Process Control Company** for more than 15 years and the successful cooperation

between the two companies is strongly strengthened during these years. We are proud that Standel is among the TOP 25 buyer of **NIVELCO** in each and every year. In the Estonian market **NIVELCO** products are really attractive due to the excellent price/performance ratio and the 5-year general warranty. The versatile product portfolio

offers measurement solution for almost all kinds of industry demands and the HART® communication capable smart field transmitters can be easily integrated into higher level automation systems.

Our goal is to provide customized solutions for our customers. We are engineers and our business objective is to meet clients' requirements. Standel's product range is very wide and there are a many different kinds of industrial automation equipment.

Our customer, the Estonian domestic capital based Napal AS was founded in 1993. The company's main business areas are installation and servicing of heating equipment. Napal have built, renovated and commissioned more than 1500 MW boiler houses capacities – steam boiler-houses, district heating boiler-houses and thermal oil boiler-houses.

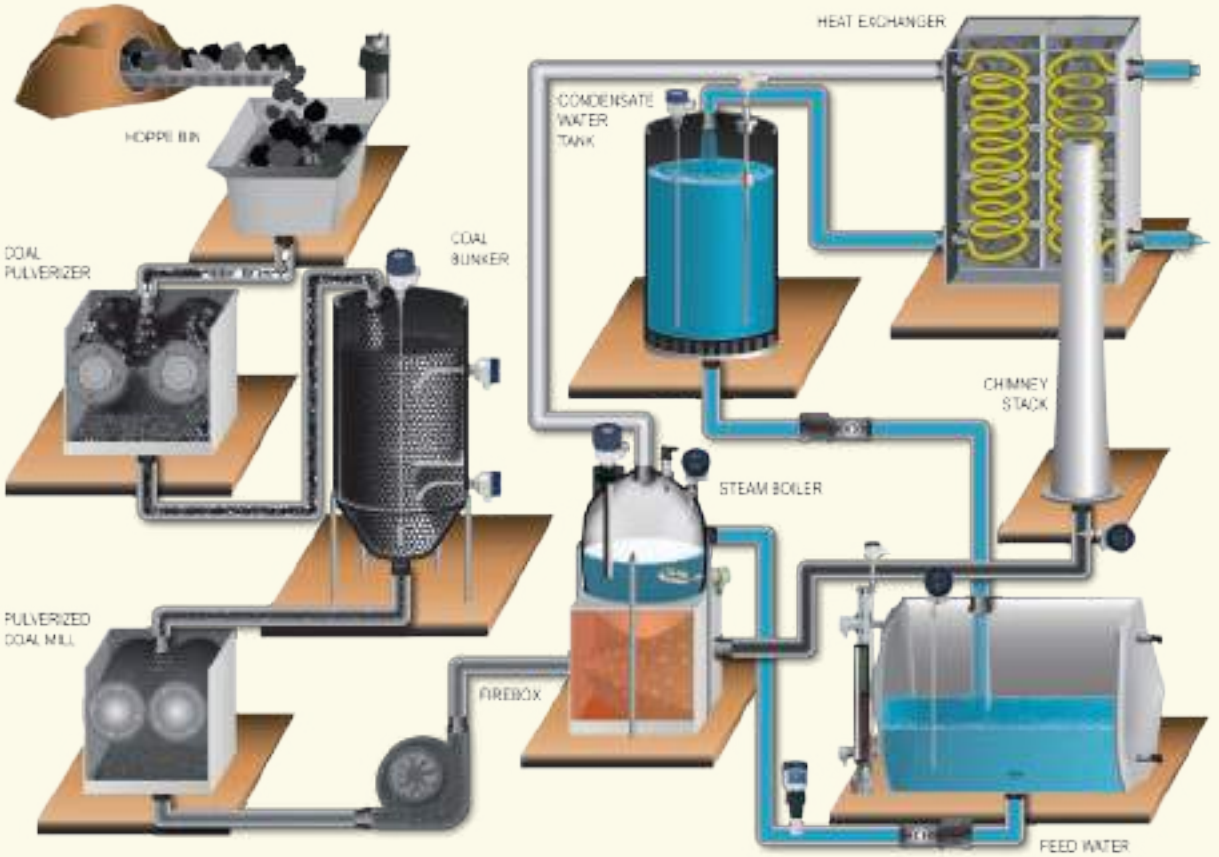
Thermal oil boiler-houses are using petroleum products which are replacing the less economical steam boiler plants. In these thermal oil boiler houses there are more than 40 **NIVELCO** manufactured high temperature type **MicroTREK** guided wave level transmitters used for monitoring and control thermal oil level in different height and shaped oil tanks.

Gaining such a high market share made possible for Napal AS to run high quality 24-hour service system. By 2008, the number of service sites had been risen to a level (at the moment there are more than 100 sites), which required establishment of the separate company.

This means more new oil tanks to be established and we hope this will result in more **MicroTREK** transmitters operating in *Estonia* in the future.

Urmas Sarv – Managing Director – AS Standel

STEAM BOILER



The most important mechanical element of all industrial manufacturing units is the boiler-house, which produces the necessary technological heat energy especially in the food and beverages, chemical- and the pharmaceutical industry.
Heating of the stem boiler can be performed with coal, oil, gas, fissile material, or any alternative energy source. The process flow diagram shows the instrumentation of a coal powered steam boiler.

INSTRUMENTATION OF THE COAL-LINE

- Monitoring the coal hopper bin with **EchoTREK SCD-34J** type ultrasonic level transmitter, full state indication
- Continuous level transmitting of the coal bunkers with **MicroTREK HTN-400-Ex** guided radar transmitter, low and high level switching with **NIVOROTA** rotary paddle level switches

INSTRUMENTATION OF THE STEAM BOILER

- Continuous level transmitting with **MicroTREK HHR-400** instrument, which controls the feed water pump
- Continuous temperature measurement with **THERMOCONT TBJ-500** type temperature transmitters
- Continuous pressure transmitting with **NIPRESS DRC-400** pressure transmitter, which controls the burning
- Low and high level switching with **NIVOMAG MKA-210** magnetic coupling level switches, which stop the boiler

INSTRUMENTATION OF THE STEAM BOILER

- Optical level gauging with **NIVOFLIP** bypass liquid level indicator and continuous level transmitting with **NIVOTRACK MTL-500** type magnetostrictive level transmitter (mounted on the **NIVOFLIP**), which controls the feed water supplement
- temperature measurement with **THERMOCONT TBJ-500** type temperature transmitters
- Low and high level switching with **NIVOSWITCH RCM-400** type vibration fork level switches
- Conductivity measurement with **AnaCONT LCK-200** compact conductivity transmitter

INSTRUMENTATION OF THE CONDENSATE WATER TANK:

- Continuous level transmitting with **NIVOCAP CTR-200** conductive level transmitter
- Multipoint level switching with **NIVOPOINT MRC-400** magnetic tracking level switch, which controls the filling / emptying of the tank

EASYTREK SCD ULTRASONIC TRANSMITTER IN PLASTICS PROCESSING

HUNGARY

LEVEL MEASUREMENT IN THE PLASTIC GRANULES SILO

In the 21st Century during our everyday life we can meet numberless kinds of plastics pretty much everywhere. Our ordinary objects and many automotive parts are made of plastics, but other industries are also considered as heavy users, such as the chemical, pharmaceutical, and the agriculture industry. In *Hungary* both types of manufacturers can be found those who are making raw materials and those who are creating everyday objects from the raw materials.

This second category includes our partner WOLF PLASTIC, a plastics-processing company in Fertőszentmiklós. The western Hungarian company manufactures its products with the well-known injection moulding and blow moulding processes. The product ranges include storage containers, watering cans, other household items, and a wide variety of different garden tools. The prepared plastic materials arrive to the processing plant in the form of granules and stored in different sized outside silos. Filling and emptying of the storage silos is done by pneumatic system.

The silos are divided into two groups according to the size: there are 6 x 8 m (26.25 ft) high and 6 x 15 m (50 ft) high silos. The material level in the silos is constantly changing according to the processing.

Recently it has become a requirement for the company management that the quantitative data of raw materials have to be continuously up-to-date, due to the diversity of production processes and the big production numbers. This has contributed to obtaining better predictability and more economic procurement which shortened the required production time to fulfil orders. So it was time to replace the 6-year old still operating mechanical (yoyo) level measurement system with a more modern and more accurate version. Finally, after long deliberation the solution offered by **NIVELCO** has been chosen.

THE OFFERED AND EQUIPPED INSTRUMENTS FOR THE LEVEL MEASUREMENT OF THE SILO SYSTEM:

- **EasyTREK SCD-33J-4** ultrasonic transmitters – 12 units
- **NIVOSONAR SFA-355-0** separate plastic flanges – 12 units
- **NIPOWER PPK-331-1** power supply – 4 units
- **MultiCONT PRC-2MA-1** universal process controller – 1 unit
- **NIVISION** process visualization software

The equipped level transmitters are continuously measuring the level in the silos and transmit the measured values via HART® protocol to the **MultiCONT** multichannel controller which transmits the data via RS485 communication line to a PC.

The **MultiCONT** unit allows the display of the measured values and the remote programming of the level transmitters, so it's not necessary to climb to the top of the silo to change the settings.

NIVISON process visualization software is installed to the central PC that offers a wide range of visualization elements of the measured and limit values, time based trends, databases and logs for the factory management and to employees. By **NIVISION** exporting and importing different database types and database searches is also possible.

THE EFFECTIVENESS OF THE INVESTMENT

The measurement accuracy improved remarkably compared to the previous system. The inventory process reduced to only a couple of minutes from the occasionally up to 1 hour. In addition the maintenance time and costs dropped dramatically.

The **NIVISON** visualization software has been jointly designed by **NIVELCO's** technicians and the factory's specialists. The program is very easy to use, full of built in functions even for the smallest processes including batch tracking, or level indication aided with colour-codes for better visibility which is very important information about the distribution of the stored quantities.

The raw materials are mostly arriving by tank trucks. So a "switch" has been built into the **NIVISION** system which changes the silos colour signal to green if a whole truck of material can be loaded into it securely.

Therefore the management personnel only need to take a look over the material type to saw which silo should they guide the tank truck. Our partner is really satisfied with the system operating safely for several months.

Ákos Noll – Sales Engineer – NIVELCO CO.

NIVELCO MEASUREMENT SYSTEM IN SPONGE PRODUCTION

ROMANIA

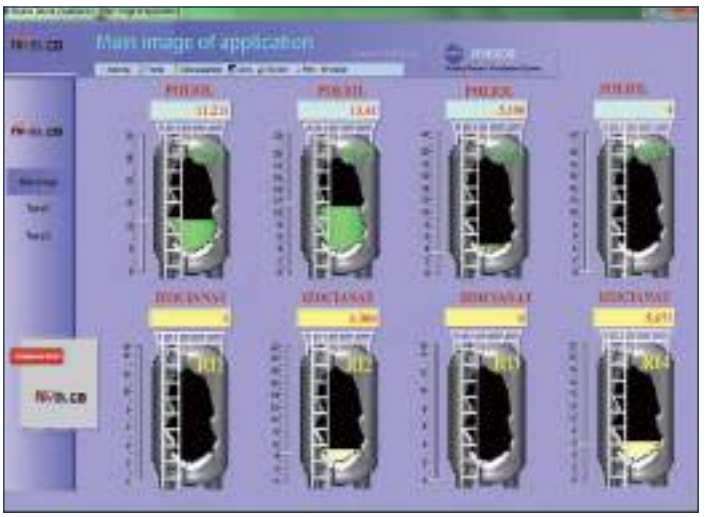
Spumotim is an automotive supplier company manufacturing multiple kinds of sponge for car-seats. Moving the production plant closer to the Romanian car manufacturer Dacia (a subsidiary of the French carmaker Renault), Spumotim established its second plant in *Pitesti*. The first plant in *Temesvár*, built in 2006, was instrumented with **NIVELCO** transmitters, where they were very satisfied with the **NIVELCO** products – especially in terms of the product quality and the support service – so they again chose **NIVELCO** instruments. The shape and the durability of a sponge are only two from the numerous aspects that manufacturers have to take into consideration during the design of car-seats.

It is essential in terms of comfort and safety to achieve the proper composition of the compounding materials. That's why continuous level measurement is needed in the tanks of the raw materials for the production process. The instrumentation tasks include level measurement, level switching and continuous stock management on 4 polyol and 4 isocyanate tanks.

THE FOLLOWING INSTRUMENTS WERE INSTALLED:

- **EasyTREK** integrated ultrasonic transmitter (8 units)
- **NIVOSWITCH** compact vibrating fork level switch (8 units)
- **MultiCONT** expandable multichannel process controller
- **UNICONT PJK** universal interface module (4 units)
- **NIVISION** process visualization software, with accessories

The complexity of the instrumentation task was increased by the requirement to provide access for the centralized stock management of the two plants from one common control centre.



For the level measurement task, the best-known **EasyTREK** integrated ultrasonic transmitters were chosen, following experience in the plant in *Temesvár*, because its accuracy and reliability fully meet the requirements of this measurement task. Measurement signals are processed by a **MultiCONT PR-200** expandable multichannel process controller. With the help of HART® communication the process values are transferred via an RS485/Modbus serial line to the process controller PC. The **MultiCONT** is also responsible for the high alarm indication which is realized with **UNICONT PJK-100** universal interface modules.

The low-level switching is performed by **NIVOSWITCH RFM-400** compact vibrating fork level switches and the relay outputs of the switches are connected to an indicator panel.

The **NIVISION** process visualization software receives the measurement data from the **MultiCONT** and visualizes the actual level on the tank-farm. The controller PC in *Temesvár* and the central management PC are also connected via a remote desktop connection to this PC running **NIVISION**. The complete installation, programming and configuration tasks for the **NIVISION** were done by **NIVELCO Romania**'s team.

András Olteán-Péter – Managing Director
– NIVELCO Tehnica Măsurării SRL

NIVELCO INSTRUMENTS IN ITALY

NIVELCO TRANSMITTERS COMMISSIONED BY ISOIL

ISOIL Industria Spa, the exclusive Italian distributor of **NIVELCO** has over 50 years experience of providing measurement solutions in the fields of power, agriculture, chemical, energy, food and water industry. The successful business relationship between the two companies has resulted that many **NIVELCO** devices have been operating throughout Italy over the last 15 years.

Thanks to this long term cooperation we can share two interesting application stories about **NIVELCO** manufactured level transmitters.

PLASTIC MATERIALS STORAGE AND PRODUCTION

Borealis offers a comprehensive range of innovative polypropylene (PP) and thermoplastic polyolefin (TPO) plastic solutions for automotive applications such as dashboards, door panels, center consoles, trims, structural components and more. ISOIL supplied the complete level measurement and monitoring system for the tank farm including other field devices. Installed NIVELCO instruments:

- **MicroTREK HTN-412-4** guided microwave level transmitter – 2 units
- **EasyTREK SCD-330-4** ultrasonic integrated level transmitter – 3 units
- **EchoTREK STD-33J-3** ultrasonic compact level transmitter – 18 units
- **NIVOCONT RKH-602-1** and **NIVOCONT RKH-605-1** vibrating rod level switches – 75 units
- **UNICONT PDF-401-4** Loop Indicator – 4 units
- **MultiCONT PRW-18A-2** multichannel process controller – 4 units
- **NIVISION** process visualization software

The **UNICONT PDF** loop indicator displays the data of four load cells in the control room. As a HART® converter the **UNICONT PDF** devices ensure that the measurement results of the measured cells can be integrated into the system and can be displayed with the **NIVISION** software. The **NIVOCONT R** vibrating rod level switches perform low / high fail-safe indication for the small mixing tanks while the ultrasonic and guided microwave level transmitters measure the raw material and finished product storage tanks.

Fabio Barbieri – Product Manager – Isoil Industria SpA.

NIVOFLIP BYPASS LEVEL INDICATOR IN THE STEEL INDUSTRY

FRANCE

In this success story our readers can read about an application in the steel industry for monitoring and controlling the liquid level in a small vessel using **NIVOFLIP** bypass liquid level indicator and **NIVOTRACK** magnetostrictive level transmitter.

The end-user is one of the leading steel producers in France having wide customer-base primarily from the players of the automotive industry. In their factory in Northern-France they use innovative manufacturing technology to produce the so-called grain-oriented electrical steel.

In the form of laminated, wound or punched sheets, it is the essential core material of energy-efficient transformers and generators. Grain-oriented electrical steel is an important material in the production of distribution transformers, power transformers and small transformers used in so many equipments wherever motion is transformed into electrical energy or electrical energy is transformed into motion and where electrical energy is transmitted across large distances.

Prior to rolling the steel sheets to huge spools they are cleaned with demineralised water which is stored in a small vessel. The installed **NIVOFLIP** bypass level indicator has 550 mm (1.8 feet) flange to flange distance and the unit provides clearly visible optical display. The bypass chamber is equipped with a **NIVOTRACK** magnetostrictive level transmitter which performs high accuracy level measurement and displays the level on the **SAP-300** plug-in display module and transmits the measurement data to the central control room.

The bypass chamber is also equipped with 3 units **MAK-100** level switches performing high limit, low limit, and low fail-safe level alarm indications. The temperature of the stored demineralised water is +80 °C (176 °F) and the process pressure is atmospheric. The next step of the manufacturing process after cleaning is the heat treatment.

Before the end-user has found the suitable **NIVELCO** level measuring system offered by C2Plus, he had some troubles with other conventional bypass units, suffering from not only the insufficient accuracy, but also the unreliable performance. The complete measuring system based on the **NIVOFLIP** device proved to be an excellent solution for our steel industry partner since it performs highly reliable operation thanks to the **MAK-100** limit level switches and provides high accuracy level measurement solution by the **NIVOTRACK** magnetostrictive level transmitter.

Christophe Carreira – CEO – C2Plus

NIVELCO INSTRUMENTS IN THE DANUBE STEELWORKS

Steelworks in *Dunaújváros*. A factory-city inside the city. Those who have been there, know, those who have not been there need strong imagination to be able to imagine the milieu of this factory, the only one steel and coke production plant of *Hungary*, which is also famous throughout Europe and all over the world. This corner of Hungary puts both human, machine and technology to the test. Workers are giving testimony to the perseverance and commitment of their profession in Dunaújváros.

NIVELCO is present in almost every section of the plant with instrumentation solutions. Within this in the coke works **NIVELCO** provides unique measurement possibilities in many areas contributing mutual success to each other.

Pyrolysis of coal means the heating of the coal in oxidation-free medium producing gases, liquids and solid residues (coke or char). High-temperature pyrolysis of coal is called to carbonization.

Temperature of the flue gases is 1150 … 1350 °C heating the coal indirectly to 1000 … 1100 °C producing furnace and foundry coke. In the furnace coke is the primary reducing material, cannot be fully replaced by other materials such as coal. Coke is an auxiliary material which helps the gas to circulate in the process material. Coke dust is an important raw material in several branches such as chemical industry. Only certain coals can be transformed into coke and numerous types can be mixed into compound, for example coking or bituminous coals having statuesque properties.

Processes of coke production can be divided into several subclasses, one of these is the coal treatment and the coal charging between the block operations, classification of the finished product of the coking. Instrumentation of the cokeworks and controlling of the processes are the connection points to **NIVELCO**. Coal is placed into open tanks or closed coal bunkers. Closed coal bunkers mean a group of huge concrete silos with 34 m (111 ft) height and 9 m (29 ft) diameter. Coal inside them is in divers forms, in blocks with diameter up to 30 cm (1 ft), as a wet dollop, or very fine dusty particular material caving or arching, regularly sticking up even to the vertical walls of the silo.

Filling level of the closed tanks is very important information for the technology. Measurement in this and in similar areas is one of the strengths of **NIVELCO**. Excellent and suitable instrument offered by our specialists is the **EchoTREK SBD-31J-8** Ex ultrasonic level transmitter. This instrument has a range up to 60 m (200 ft) with a narrow beam angle. Well-chosen mounting place guarantee measurement even during the filling of the tank. Efficient signal processing and noise suppression, temperature compensation in the whole range and 'Dust Ex' type makes our EchoTREK to the best choice.

Unique console setting of the instrument complies with the arching resulted by the different grain-size pieces. Presently 14 of these instruments are operating perfectly in the coal bunkers. During the classification of the finished product of the coking process, vast amount of very fine dust is issued.

Separation of this dust is made by the static dust cleaning section with high-voltage. In this process, the collected dust are stored in dust-tanks, filling and empting control of these tanks is done by **NIVOSWITCH RLH-304-E Ex** vibrating fork level switches in 4 tanks in each floor. These switches with non-parallel fork tines make possible a reliable switching even in case of sticky dust.

THERMOCONT temperature transmitters and **NIPRESS** pressure transmitters are also applied in the cokeworks for gauging temperature and pressure of the gases used and produced during the coking process.

József Kaplonyi
– Domestic Sales Engineer
– NIVELCO CO.

MICROTREK LEVEL TRANSMITTERS IN THE STEELWORKS OF ÓZD

Steel production technology is based on: melting the raw material (scrap steel); adding slag-forming materials for purification; adding alloying materials in order to achieve the required steel quality.

An important part of steelmaking technology is the formation of slag, and its main component is limestone. Since limestone is lighter than the steel, it floats on the surface of the molten steel. Slag usually acts as a destination for oxidised impurities, and as a protective layer it prevents oxidation. The composition of the slag impacts on the quality of the processed steel.

The steelmaking traditions in *Ózd* look back on over one hundred years of history. In the steelworks of *Ózd* modern electro-steelmaking technology is used. Scrap steel is fed into the electric arc furnace where melting and alloying, then pouring processes are performed. Along with the limestone, there are other auxiliary materials such as coal powder, and manganese or silicon based alloys. These materials are stored in standing silos and the process control system feeds the required amounts into the electric arc furnace. The control system and its personnel have to be properly informed about the quantity of materials in storage to be able to supervise the delivery amount required from each auxiliary material. The steelworks of Ózd chose **NIVELCO** instruments for these important measurements.

THE INSTALLED MEASUREMENT SYSTEM WAS DESIGNED FOR SOLVING THE FOLLOWING TASKS:

- Providing continuous level measurement in the silos and overcoming the harsh environment. The 8 meter tall silos sometimes stores fistful-sized pieces of manganese or silicon. The 8 mm (0.3 inch) diameter stainless steel cable probes of the **MicroTREK HTN-408-4** guided microwave level transmitters have to withstand the effects of such abrasive materials.
- Measurement of the sticky limestone powder level is done by **MicroTREK HTN-412-4**. These transmitters have a 12 m (40 ft) long stainless steel cable probe.
- The coal powder is not just a sticky material, but is a Dust Ex product, which is stored in 10 m (33 feet) tall silos. The levels of these silos are regarded as very important data for the process, and it is measured with the **MicroTREK HTN-410-6 Ex** cable probe, Dust Ex version.

- Measurement data transmission to the process control system is not the only requirement: there was a demand for a local display of the measured levels. **UNICONT PDF-401-2** type loop displays were installed to solve this task.
- Along with continuous level measurement, low and high level switches provide alarm signals to allow intervention in case of an empty silo, or overfilling. Low level indication is performed by side mounted **NIVOROTA EKH-702** standard versions, high level indication is done by top mounted **NIVOROTA EKK-710** cable extended rotary paddle level switches.

- Temperature measurement and display of the secondary produced fumes are essential to provide secure production operations. **THERMOCONT TLJ- 513** type temperature transmitters are able to measure, display and transmit the temperature data of the furnace fumes.

The extreme dusty environment produces extra-ordinary challenges for the instruments, usually there is more than a centimetre thickness of a powder layer on the devices, after only a few days operations. Despite these harsh circumstances all **NIVELCO** products operate reliably and perfectly, with rarely needed maintenance.

NIVELCO is proud to prove its 'know-how' in extremely dusty solid level measurement, in such a heavy industry segment.

Sándor Ujfaludi – Domestic Sales Engineer – NIVELCO CO.

NIVELCO IN MECHANICAL ENGINEERING AUTOMATION

Linamar *Hungary* is the Hungarian subsidiary of Canada's leading automobile parts manufacturer. One of its production halls is the PPM (Precision Part Manufacturing) in *Békéscsaba*. Linamar produces steel automotive parts in four main phases: casting, machining, purification by a high pressure cleaning system, then coating on request. The high pressure cleaning system was instrumented with **NIVELCO** products.

INSTRUMENTS OF THE TECHNOLOGY

Each workpiece comes under high pressure when it is inserted in the cleaner. Then the machine performs the needed filtering-cleaning wash and finally rinses the workpiece before repeating the cycle. This washing procedure is under 200 bar (2900 psi) pressure, done with a high purity mineral oil. The filtering-cleaning Common Rail equipment removes any possible small (0 – 3 μm) particles or pollution remaining from the machining process.

The washing-liquid storage tank of the Common Rail equipment is instrumented with two intrinsically safe mini compact type **NIVOTRACK MMA-504-6 Ex** transmitters. These models are the same as the standard version except for the 8 mm (0.3") diameter probe tube and the small 28 mm (1") diameter magnetic float.

The 1" process connection provides a suitable solution for the small tanks used in this application. The highly precise magnetostrictive transmitters are responsible for continuous level measurement of the washing liquid and perform level control of the tank, controlled by the 4 – 20 mA output signals.

A PLC receives the output signals and controls the filling-emptying pump. The accuracy of the **NIVOTRACK** transmitter is 1 mm which fully meets the requirements of the measurement. Along with the level measurement instruments, some additional **NIVELCO** devices have been installed as well. The local display of the measured levels is done by **UNICONT PDF-501-6** Ex loop displays.

The **UNICONT PDF**-s are in the local control room, quite far from the technological processes, so the measurement results can be read easily outside the production hall. Sensing, monitoring and displaying of the washing pressure is an essential parameter of the cleaning process.

For this task, **NIVOPRESS DBC-5H1-6 Ex** hydrostatic transmitters with a **SAP-200** display have been chosen as an excellent solution. Since the applied transmitters are explosion-proof versions it was necessary to use 4 – 20 mA isolated power supply units for the transmitters. The **UNICONT PGK-301-B Ex** modules were offered for this purpose. **NIPOWER PPK-331-1** power supply modules give supply voltage for the **UNICONT PGK**-s and thus for the transmitters.

Thanks to these accurate measurements, continuous operation is ensured for the cleaning system and the efficiency of the whole production operation increased significantly. In the framework of a future project, all measured data from the instruments will be integrated and processed by **NIVELCO's NIVISION** process visualization software.

Ferenc Dékány – Domestic Sales Engineer – NIVELCO CO.

LEVEL MEASUREMENT IN NORTH-HUNGARIAN CHEMICAL WORKS

HUNGARY

In the Industrial Park of *Szentgotthárd*, the *Hungarian* subsidiary of the American-based Allison Transmission Inc. (the world's largest manufacturer of fully-automatic transmissions) established a new production hall.

The key element of the production line is the oil container tank-farm with its complex instrumentation and electrical installation tasks.
NIVELCO had to provide a complete solution, to include material specifications for the electrical system, and including wiring tasks, instrumentation and all accessories for the process automation system. Finally the customer has chosen **NIVELCO** thanks to the high technical level of the offered solutions, especially the level instrumentation, the stainless steel control panels, and the galvanized cable mounting structures. Moreover **NIVELCO** was being proven as a reliable partner in the design of the complete technological implementation along with the provided great price/value ratio. As a standard task, the continuous measurement of lubricant oil and emulsion tanks, and the control of filling-emptying pumps was also designed and commissioned by **NIVELCO**. Since the facility operates in a JIT (Just In Time) production strategy, any failure of the process control system hinders the production seriously, so indication of alarm and warning signals for the monitoring system was necessary.

MEASUREMENT SOLUTIONS

- **MicroTREK HT-400** series guided radar transmitters measure the level in oil and oil-emulsion tanks. The control system continuously monitors the quantity of the homogeneous media, the level of each specific tank and the total quantity of the tank-farm, providing a reliable source of information for the filling and emptying processes
- Overfill protection on the tanks is achieved by **NIVOMAG MKA-210-4L** magnetic level switches. To avoid the possibility that any leakage may happen when using side-mounted equipment, the L-arm type **NIVOMAG** was chosen for this reason. In addition to this, the required switching differential parameters were easy to provide with this version.
- Leakage detection on the double-walled tanks is achieved by **NIVOSWITCH RCM-400** vibrating forks. Thanks to the vibrating forks, the process control system is able to indicate any negligible (compared to the size of the tank) quantity (even a decilitre) of leaking oil.
- Measurement signals are processed by a **MultiCONT** multichannel process controller in a HART® multidrop loop. HART® communication facilitates centralized signal processing and provides easy access to change the parameter-base of the product-specific technology. The local personnel decide which incoming material should be stored in which tank, based on the displayed values on the **MultiCONT**.
- Two **UNICONT PJK-100** universal interface modules are connected in the RS485 line, determining low and high fail safe level from the measured values, and these modules provide quick intervention if necessary.

The filters and pumps used in the production plant are controlled by differential pressure switches, the measurement signals from these instruments are also integrated into the process controller system, therefore they are able to indicate alarm signals.
Also **NIVELCO** delivered the 2 butterfly-valves which provide alternating filling for the emulsion-collecting tanks. Local electrical wiring and the stainless steel control panels were installed by a subcontractor partner. The end users were fully satisfied with the quality of the finished project regarding as a great success for **NIVELCO's** local engineering team.

Ákos Noll – Domestic Sales Engineer – NIVELCO CO.

NIVOMAG LEVEL SWITCHES IN A RAIL CARRIER SHIP

USA

MAGNETIC COUPLING FLOAT LEVEL SWITCHES FOR SHIPS

The MV Bali Sea is an ocean going rail carrier operated by the CG Railway, *Mobile, Alabama*, which is owned by the International Shipholding Corporation. The railway operates an approximately 900 mile (1400 km) train ferry between the Port of Mobile, Alabama and the Port of Coatzacoalcos, Veracruz. The CG Railway connects with CSX Transportation, Norfolk & Southern, BNSF Railway, Canadian National and Alabama Gulf Coast Railway at Mobile, Alabama and Ferrocarril del Sureste at Coatzacoalcos, Veracruz. The CG Railway operates the MV Bali Sea and MV Banda Sea double deck rail carriers each capable of transporting 115 rail cars each.

In May, 2015, Kamil Ship Supply in Mobile, Alabama was contacted by the ship's Captain who was need of a replacement float level switch for the ship. Kamil Ship Supply provides a wide range of goods for ships and crews sailing into and out of the Port of Mobile.

The Captain provided photographs of the **NIVELCO** level switch and asked Kamil to find a replacement. **NIVELCO USA** was contacted and immediately offered a **NIVOMAG MKA-210-0** magnetically coupled level switch with the GL certification mark. An order was placed and shipped to Kamil in 3 weeks. The float switch was delivered and installed on the ballast tank system which stabilizes the ship by weighing it down and lowering the center of gravity.

The **NIVOMAG MKA** switch is used to control pumps which then fill or empty the ballast tanks as needed to raise and lower the vessel when loading or unloading cargo, or in heavy seas. The MV Bali Sea was built in Japan by Mitsubishi Heavy Industries in 1981. It is a registered 24201 ton carrier with 8 upper tracks and 7 lower deck tracks for movement of the rail cars from port to port. It began its career as a submersible, able to pick up oil platforms from the ocean and transport them to other locations. It was then converted to a barge carrier for the ocean transport of barges from location to location. Today, the MV Bali Sea and Banda Sea continue to travel several times weekly between the two ports and deliver rail cars and their cargo safely and on time.

David Miller – Managing Director – NIVELCO USA LLC

LEVEL DETECTION IN DUST COLLECTORS

NIVELCO VIBRATING FORK LEVEL SWITCHES FOR SOLIDS

PLYMOVENT Group is considered as one of the leading global manufacturer of extraction and filtration products, systems and services suitable for cleaning polluted indoor air, welding and cutting fumes, grinding dust and oil mist in the metalworking industry and removal of vehicle exhaust gases and tobacco smoke. Their Hungarian subsidiary the AC PLYMOVENT Ltd. is a successful company in the domestic and the Central European ventilation technology industry for more than two decades.

According to the agreement made two years ago between **NIVELCO** and PLYMOVENT, the company builds **NIVELCO** manufactured level switches into their dust collection tanks of car factory halls, air quality systems, community smoke and dust extractor systems, vehicle exhaust extractor systems, and extractor systems for cutting, grinding or welding machines. **NIVOSWITCH** vibrating forks operates in these applications with great reliability.

The main purpose of the different filtration technologies is the removal of the various size visible and invisible air pollutants. The dust extraction unit transmits the filtered dust to a dust collector vessel. The saturation of these vessels should be monitored and when the upper level is reached, the control unit should send a shutdown signal to the filter unit and make alert to the personnel in order to empty the dust collector vessels. In the dust collector equipment the removable dust containers are located at the bottom. There are two different types of **NIVOSWITCH** vibrating fork level switches for solids working in these applications. The primary type is **NIVOSWITCH RFM-301-0**, a 230 V AC powered version with paint coated aluminium housing and wired through cable glands. These units have relay output directly connected to the electronic control unit.

These types with casted vibrating part and fork were built into older equipments where only 1" process connection was available. Due to the design of the dust removal system explosion-proof protection was not required.
Thanks to the development of the electronic technology the newer series of the dust collector equipment are already operating from low supply voltage 24 V DC.

Here the **NIVOSWITCH RLH-301-3** level switches with non-parallel vibrating forks could be used to perform reliable detection of the accumulated dusts. The process connection size is 1½ inch because the size of the vibrating element.

When the maximum level is reached the open-collector output of the three-wired devices with DIN connector transmits the signal to the electronic control unit system.

The **NIVELCO** manufactured **NIVOSWITCH** vibrating fork level switches has been successfully used for many years since the instruments are able to operate with high reliability in many media within wide density range.

István Horváth – Head of Domestic Sales – NIVELCO CO.

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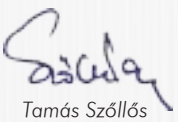

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