



Politechnika Wroclawska



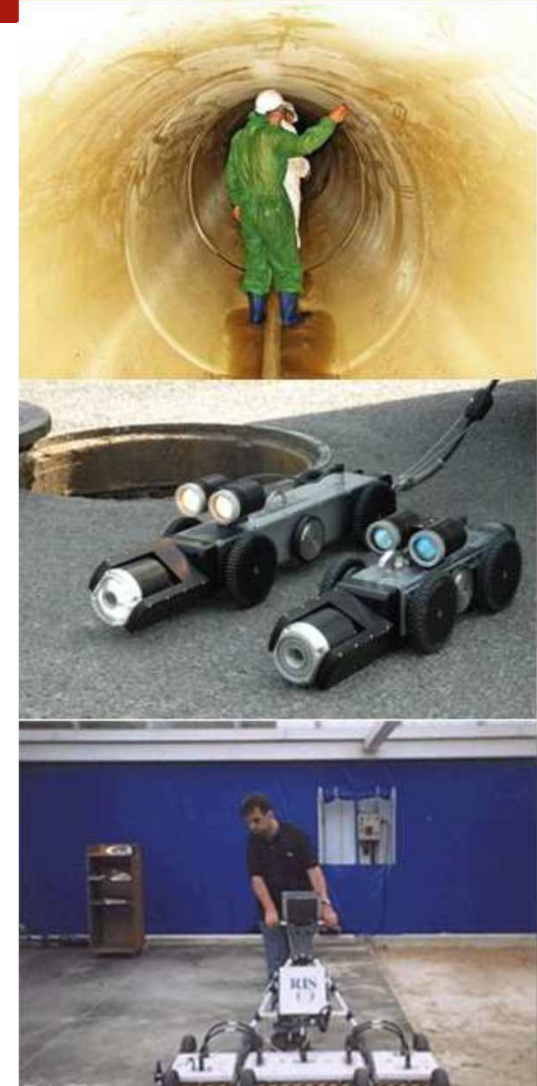
Assessment methods of network technical condition

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Assessment methods of network technical condition

- **Pipe inspection-** pass surveyed network sections
(for sewage channels DN>1000, for water pipes DN>600)
- **Pipe video inspection**
- **Non-invasive methods-** active leakage control
(eg. : georadars, geophones)





Pipe video inspection

TV inspection is to determine:

- leak connections
- places of leaks
- places of clogging
- location of illegal connections
- corrosion damage
- abrasion of walls
- position deviation
- deformation
- mechanical damage





Mechanical damage of PVC-U pipe





Unsealing joint



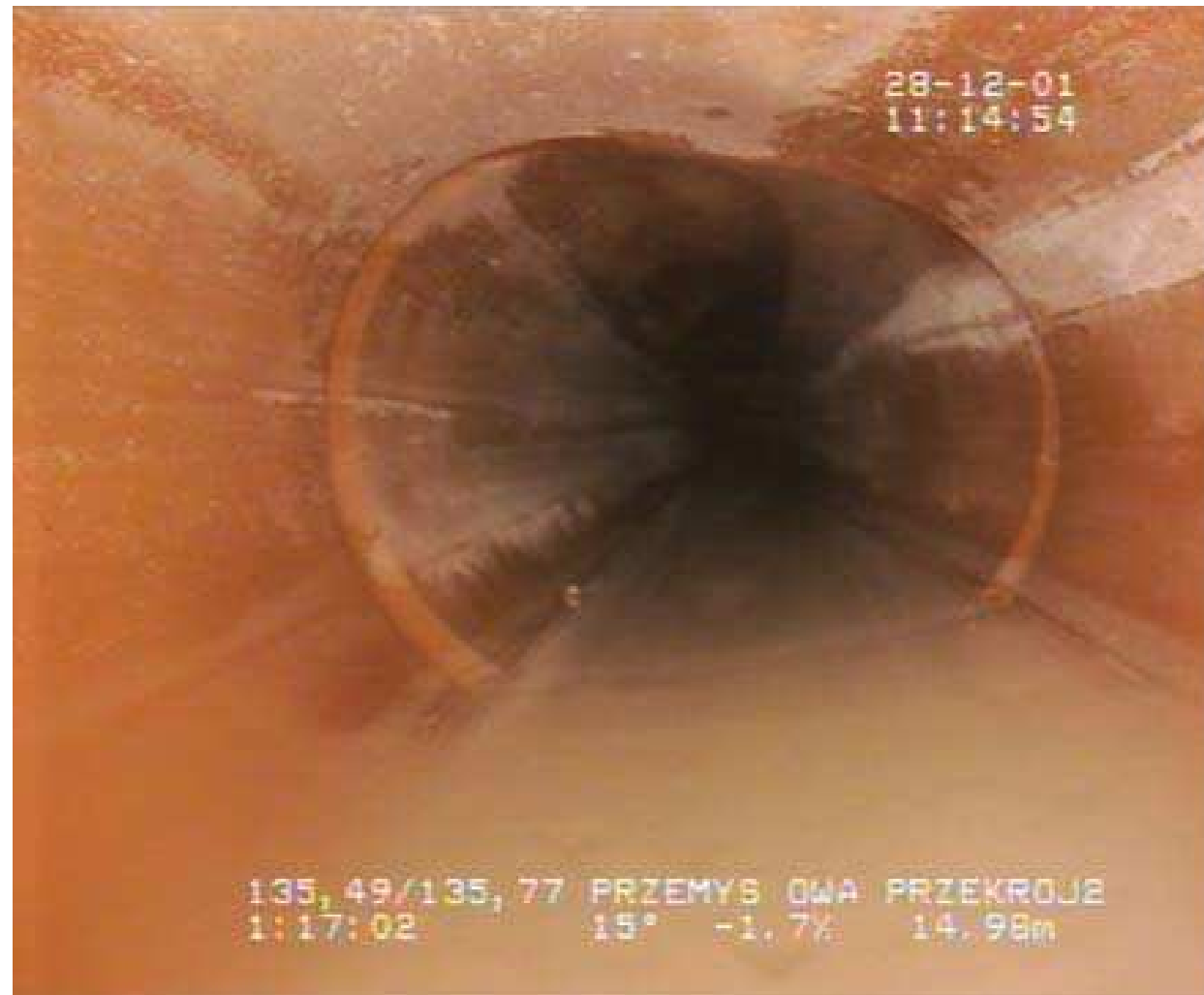


Pushed sealing





Lack of sealing





Lack of rubber





Bad done connection





The effects of sewer lines damage

- Groundwater infiltration into the sewer line
- Exfiltration of the sewage into the ground





Pipeline video inspection





Types of the video inspection systems

- Compact portable inspection systems
- Portable inspection systems with a modular design
- Inspection systems installed in vehicles
- Combi inspection systems
- Scanning systems
- QuickView inspection systems



Compact portable inspection systems





Compact portable inspection systems

- Integrated system
- Consists of the reel, cable with the light and camera and screen
- Used for the pipes: 25 mm, 70 mm, 150 mm, 250 mm or 600 mm
- locates the position of the camera
- Light
- Cannot to be used during the rainfall



Portable inspection systems with a modular design

- More universal
- Protected against rainfall
- Rotational head





Inspection systems installed in vehicles

- Long-term research
- Control panel inside the vehicle
- Research up to 500 m of the sewer lines





Combi inspection systems

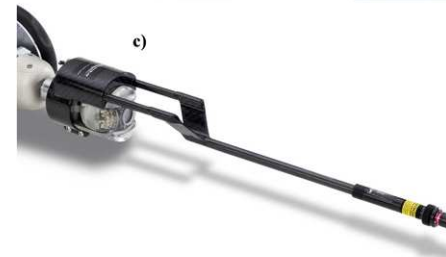
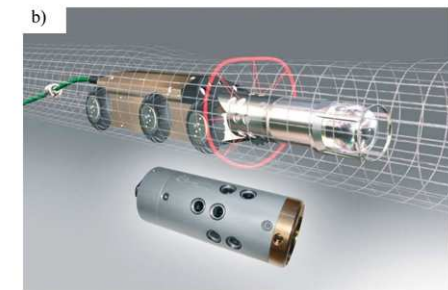
- Pressure cleaning function
- Able to make a leak test





Scanning systems

- Able to make a 3D view
- High accuracy
- High speed of trolley
- 200-800 mm diameter of pipe
- Panoramic view





QuickView inspection systems

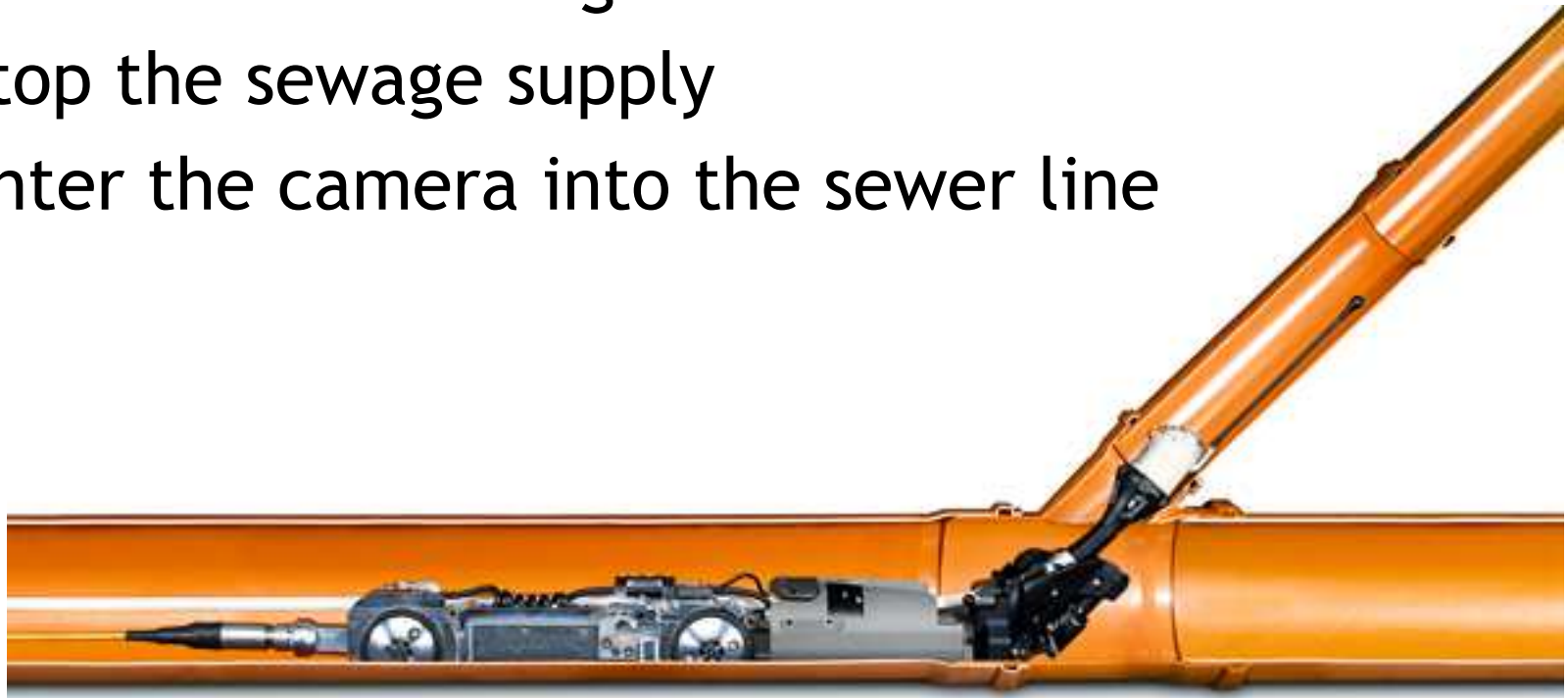
- Sewer lines do not need to be prepared
- The end with the halogen lighting
- Use zoom
- Does not show the exact location of damage





Preparation to the reserarch

- Map with the numbered manholes
- Tested route designation
- Sewer lines cleannig
- Stop the sewage supply
- Enter the camera into the sewer line





Raport from TV inspection

Foto-raport odcinka

Odcinek
414-D47 414-D46

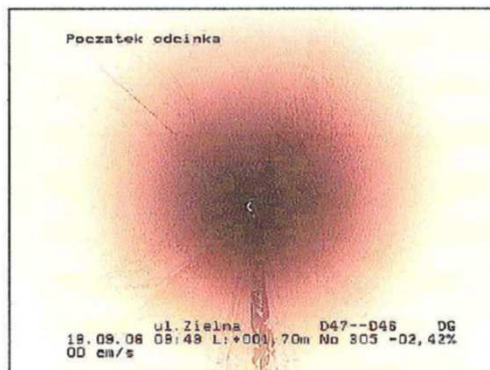
Górną studnia 414-D47
Dolną studnia 414-D46
Rodz. kanału Kanał deszczowy
Kier. inspekcji Od górnej studni

Insp. nr. 1.799
Data insp. 19.09.06

Kaseta nr. DVD

Początek odcinka

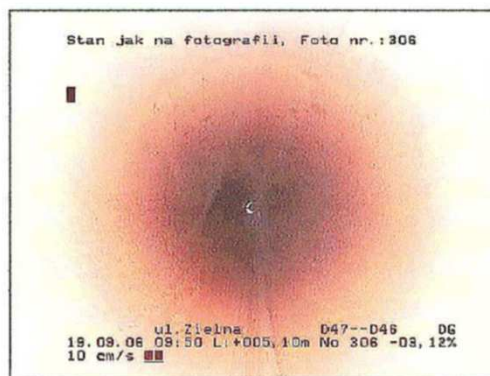
Foto 305
Video
Odległość 1,70
Uszkodz. HA



Stan jak na fotografii, Foto nr.: 306,00

Foto 306
Video
Odległość 5,10
Uszkodz. FOTO

, Foto nr.: 306,00



Opis odcinka

Odcinek
414-D47 414-D46

Górną studnia 414-D47
Dolną studnia 414-D46
Kier. inspekcji Od górnej studni

Insp. nr. 1.799
Data insp. 19.09.06

Zlecenie nr.
Podst. insp. Ocena stanu technicznego
Rodz. insp. Kamera ARGUS EEx
Kaseta nr. DVD
Video pocz.
Video kon.

Kanał nr.
Rok budowy 2006
DL inspekcji 16,60 m
DL odcinka 16,61 m
DL rur 6,00 m

Kształt kan. Okragły
Materiał Polichlorek winylu
Położenie Droga publiczna
Rodz. kanału Kanał deszczowy
Powłoka wewn.
Rodz. własn. Odcinek jest własnością urzędu

Wysokość 300 mm
Szerokość 300 mm

Właściciel
Operator mgr inż. Krzysztof Przewieźlik
Obserwator Krzysztof Mroncz, Zdzisław Limański

Miejscowość Dąbrowa Górnica
Dzielnica Strzemieszyce Wielkie
Ulica Zielna
Komentarz

Foto	Video	Odl. G	Uszk.	Tekst
305		1,70	HA	Początek odcinka
306		5,10	FOTO	Stan jak na fotografii, Foto nr.: 306,00
		16,60	EH	Koniec odcinka



Leaks monitoring in water supply systems

Monitoring is:

- a part of diagnosis of the system;
- carried out to liquidate or at least limit the number of failures or defects ;
- careful in strategic or susceptible for damages points.



Leaks monitoring in water supply systems

Monitoring allows on:

- controlling and hydraulic regulation of system;
- assessment of the quality of water supplied to customers;
- assessment of the technical state of equipment and elements;
- assessment of the reliability of the system.



Causes of failure

- excessive pressure in the system;
- incorrect pipeline arrangement;
- improper materials;
- increased hydraulic resistance;
- excessive exploitation
of the pipeline.





Causes of failure



cause - point thrust



cause - improper material



How to find a leak?

- observing the ways of pipelines arrangement
- controlling the level of underground water on ways of pipelines arrangement
- controlling the pressure in the system
- controlling of flow
- acoustic methods



How does the acoustic detectors work?

- base of operation - detecting of sounds of specific frequency
- water flowing through leak - 500-800 Hz
- water hitting the ground - 20-300 Hz
- effective in case of hard, dry ground and metal pipelines

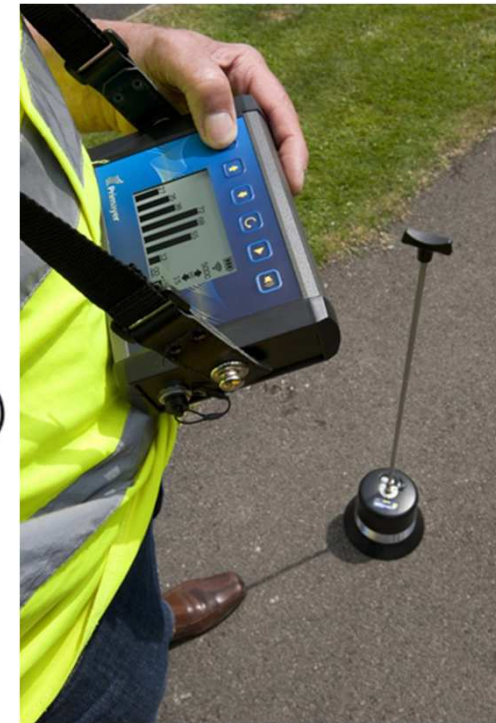




Acoustic detectors



measuring stick



geomicrophone



Acoustic detectors



correlator

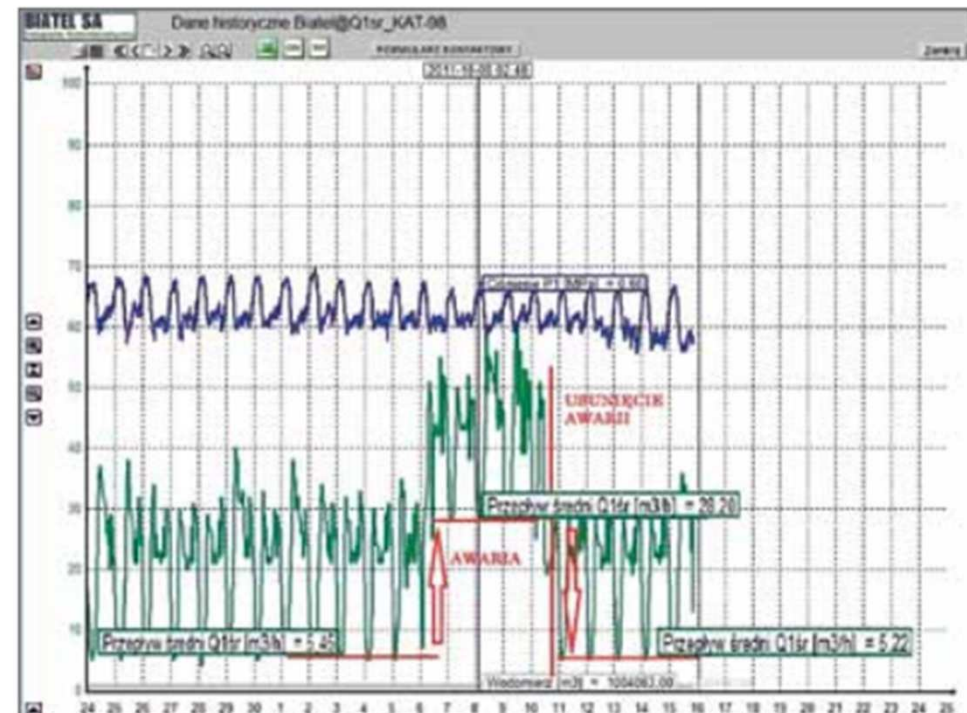
correlator





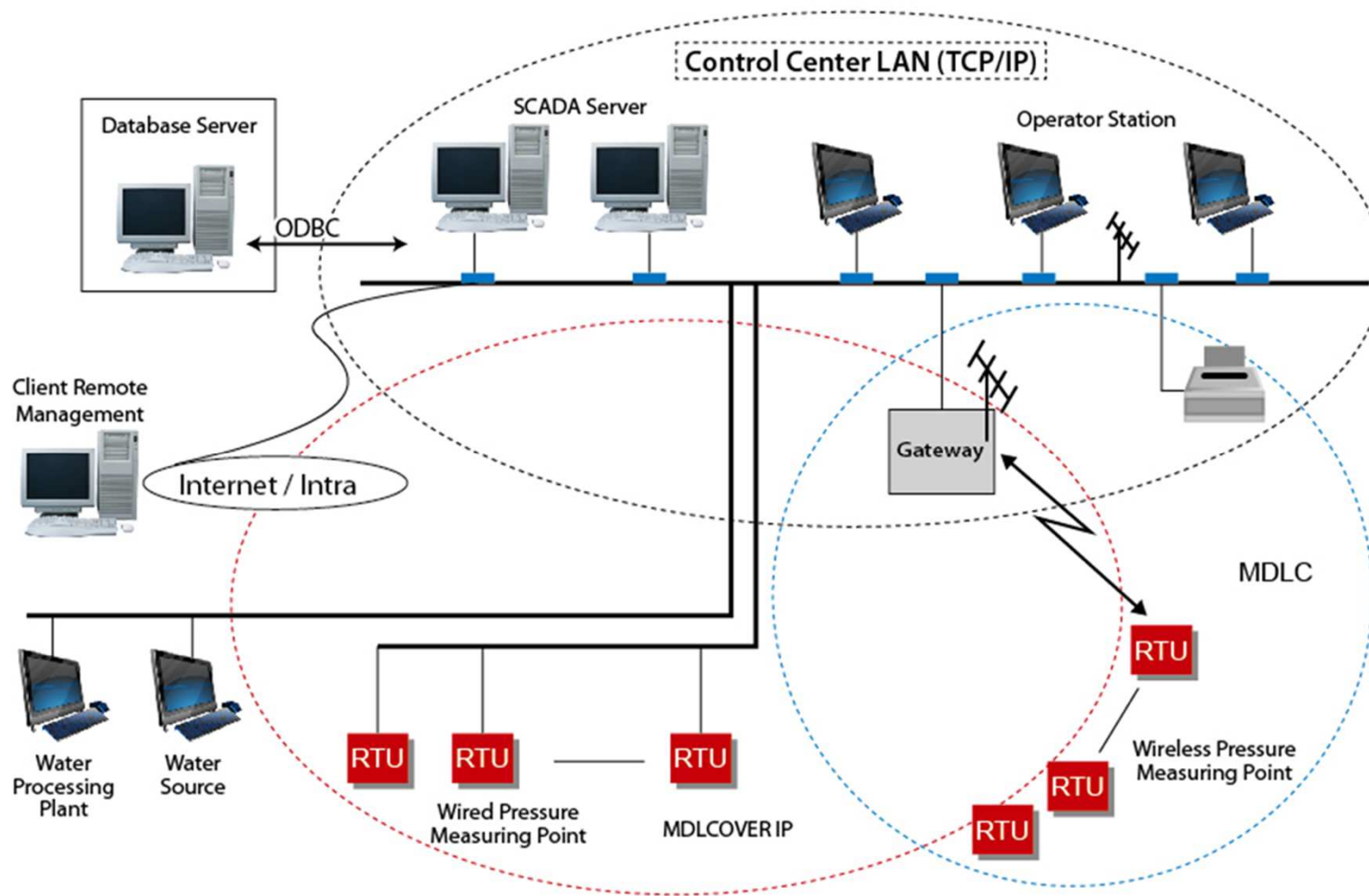
Why are night flows reliable?

- relatively stable
- when unsettled - signalize leak
- reliable indicator





How does it work?





What are requirements?

- durable
- have own power supply
- maintenance-free
- simplicity of devices and software
- data certainty
- low cost
- double archiving of data
- immediate transmission of alarms

