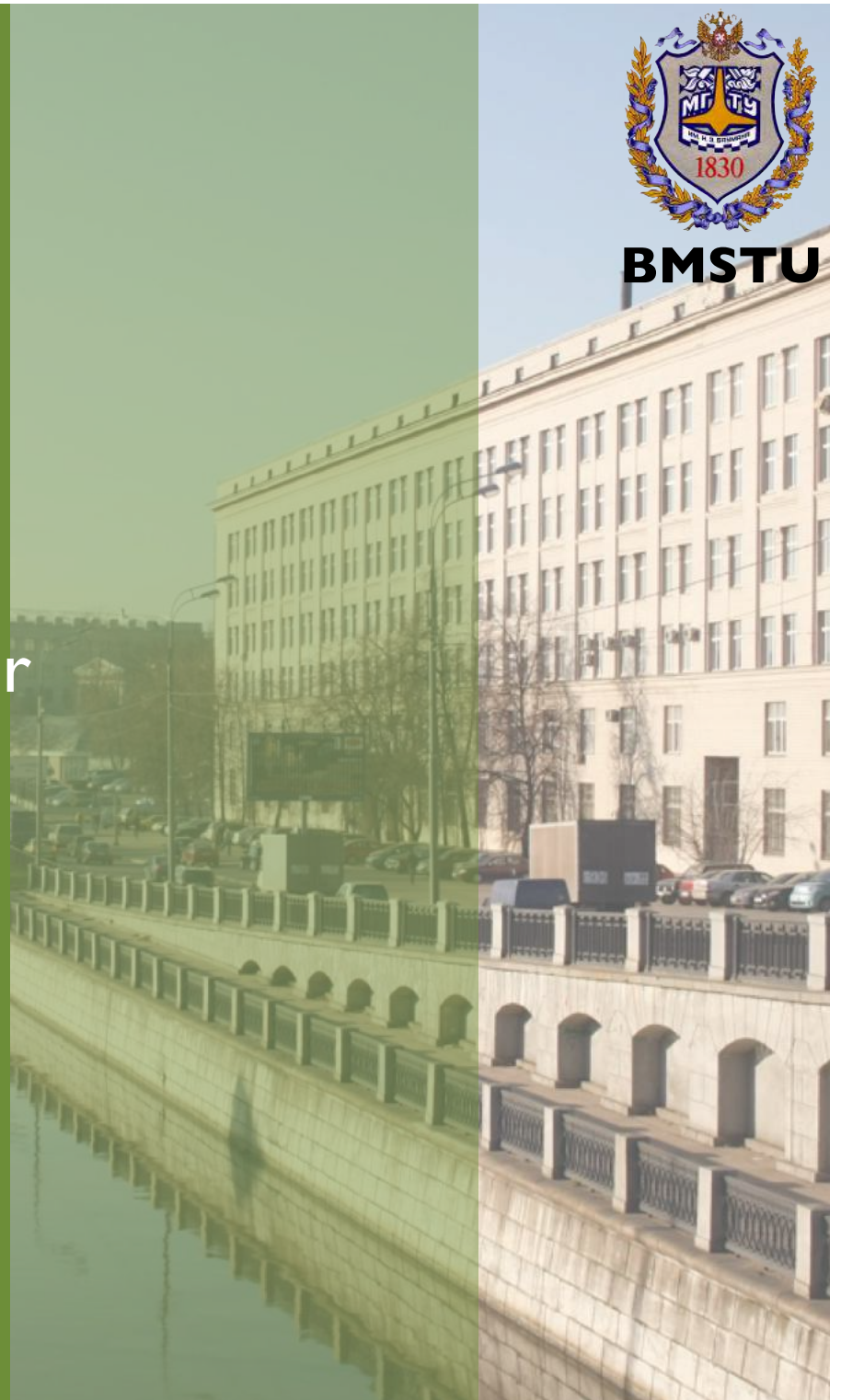




BMSTU

Educational and Research Center
**Risk Management in
Emergencies**



System Approach in Emergencies' Management



System Approach in Emergencies' Management

Professional Education in Environment Protection



Department of Ecology and Industrial Safety Education Programmes

Bachelor of Science

- Environment Protection and Rational Usage of Natural Resources
- Safety in Technosphere
- Safety in the Emergencies

Master of Science

- Complex Usage of Water Resources
- Industrial Safety
- Industrial Acoustics

Department of Ecology and Industrial Safety

Teaching Methods



Department of Ecology and Industrial Safety

Teaching Methods



Department of Ecology and Industrial Safety

Teaching Methods



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Teaching Methods



Department of Ecology and Industrial Safety

Work Based Learning

The department has strong relations with the leading state and private companies:

- Ministry of Emergencies and Civil Defense
- Mosvodocanal (city water supply and treatment facilities)
- Private water treatment companies
- Automotive companies
- And others



New Technologies in Environment Protection



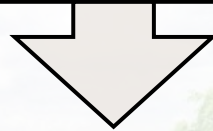
I. Water Management



I. Water Management

Issues of Conventional Treatment Line

Loss of the pollutant's micro particles



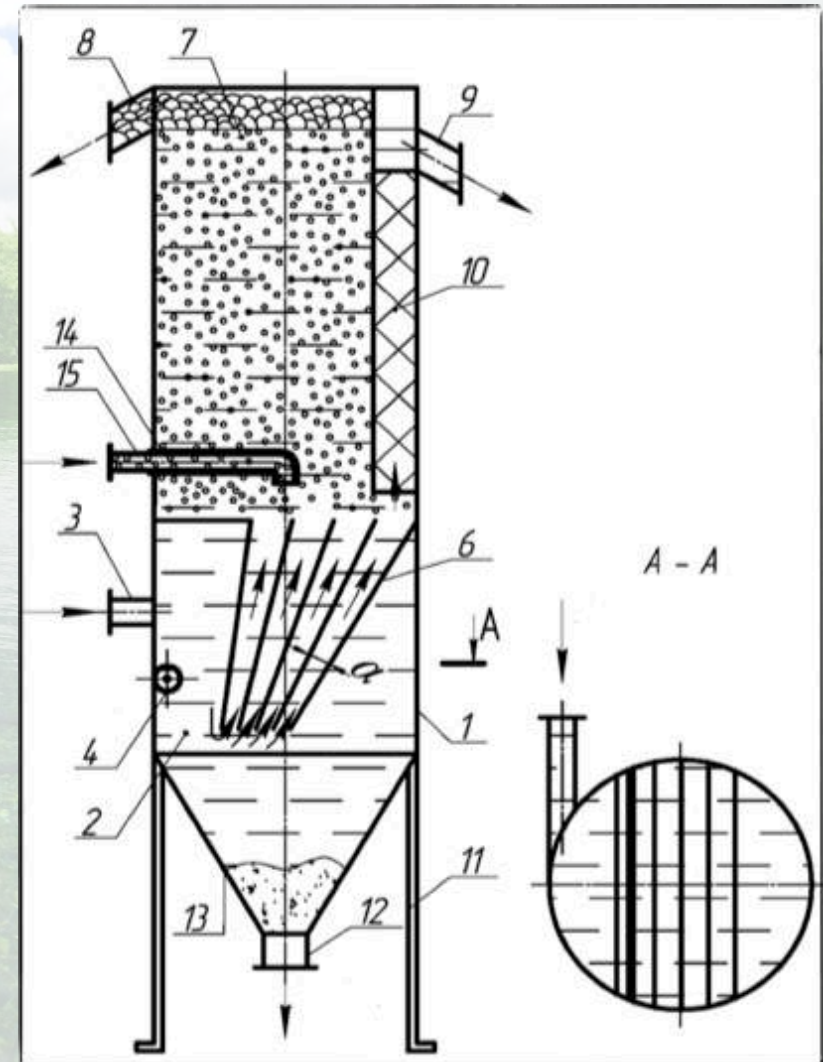
- ❖ Low treatment efficiency
- ❖ High treatment costs
- ❖ Vulnerability of the treatment line to the external factors
- ❖ Low reliability
- ❖ Large space requirements

I. Water Management Solution: “Flotation Combine”

Brief Description

In one apparatus different equipment may be built-in:

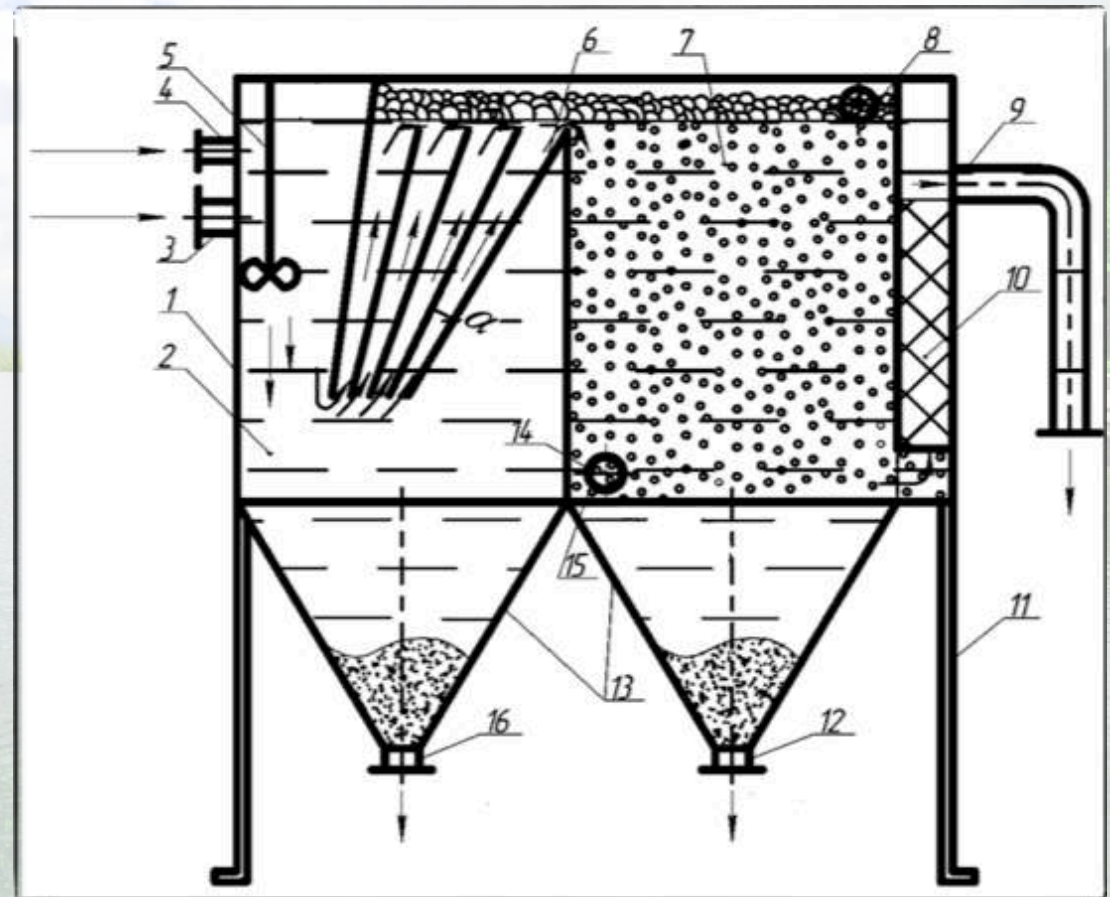
- mixers for coagulation and flocculation,
- flotation tanks,
- sedimentation tanks,
- filters



I. Water Management Solution: “Flotation Combine”

Advantages

- ✓ Brand new patented technology
- The combination of coagulation, flotation, filtration and sedimentation processes results in:
 - Metal use is **30-40%** less
 - Efficiency is **25-35%** higher
- ✓ Power consumption is **35-50%** less when compared to the conventional technological treatment line.
- ✓ Environmentally friendly



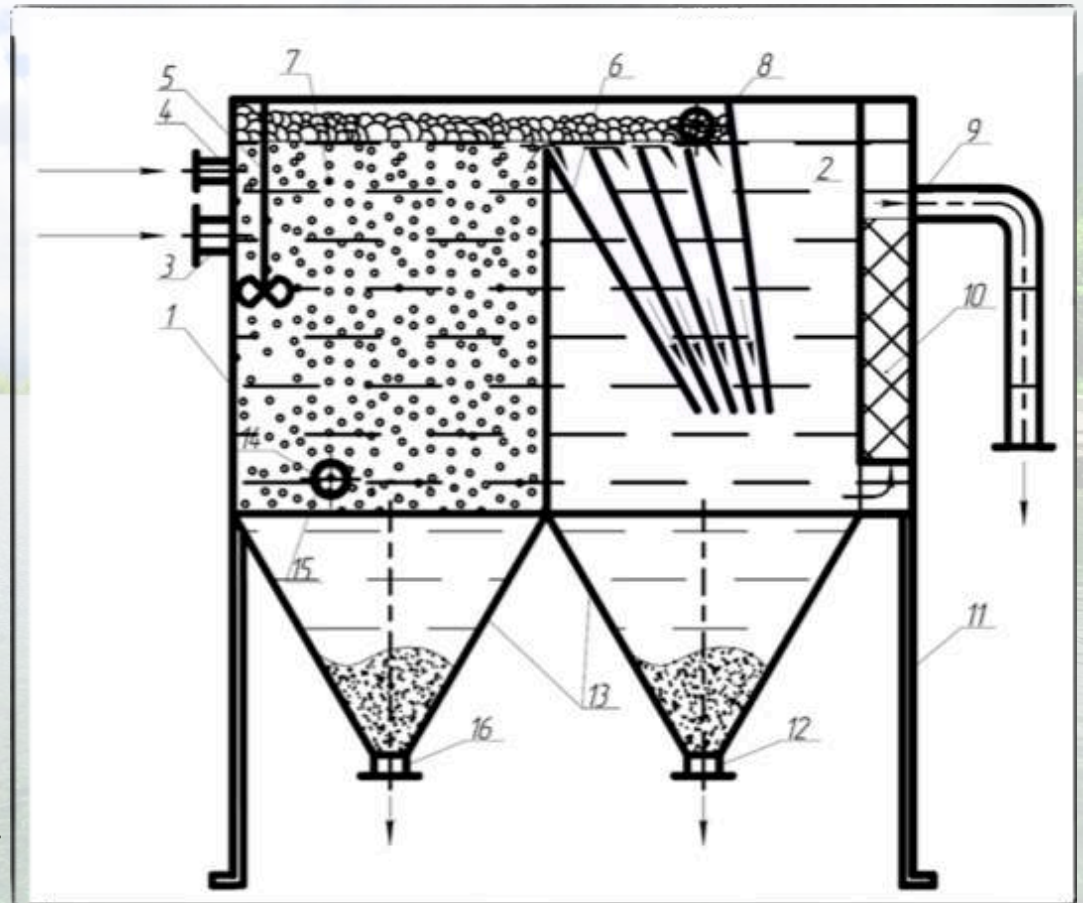
I. Water Management Solution: “Flotation Combine”

Application

Wastewater treatment contaminated with gasoline, oils, fats, greases, fiber materials and others.

Design phase

- The plant is developed on the research level.
- Two experimental setups have been built and tested.
- Further construction and testing of more experimental setups is needed.



Applications of “Flotation Combine”

Treatment Technology for Wastewaters Contaminated
with Fats, Oils, Greases



Applications of “Flotation Combine”

Universal Technology for Soil Treatment from Petrochemicals



Applications of “Flotation Combine”



Mobile Plant for Water and Soil Treatment from Oils

2. Raw Resources Management



2. Raw Resources Management

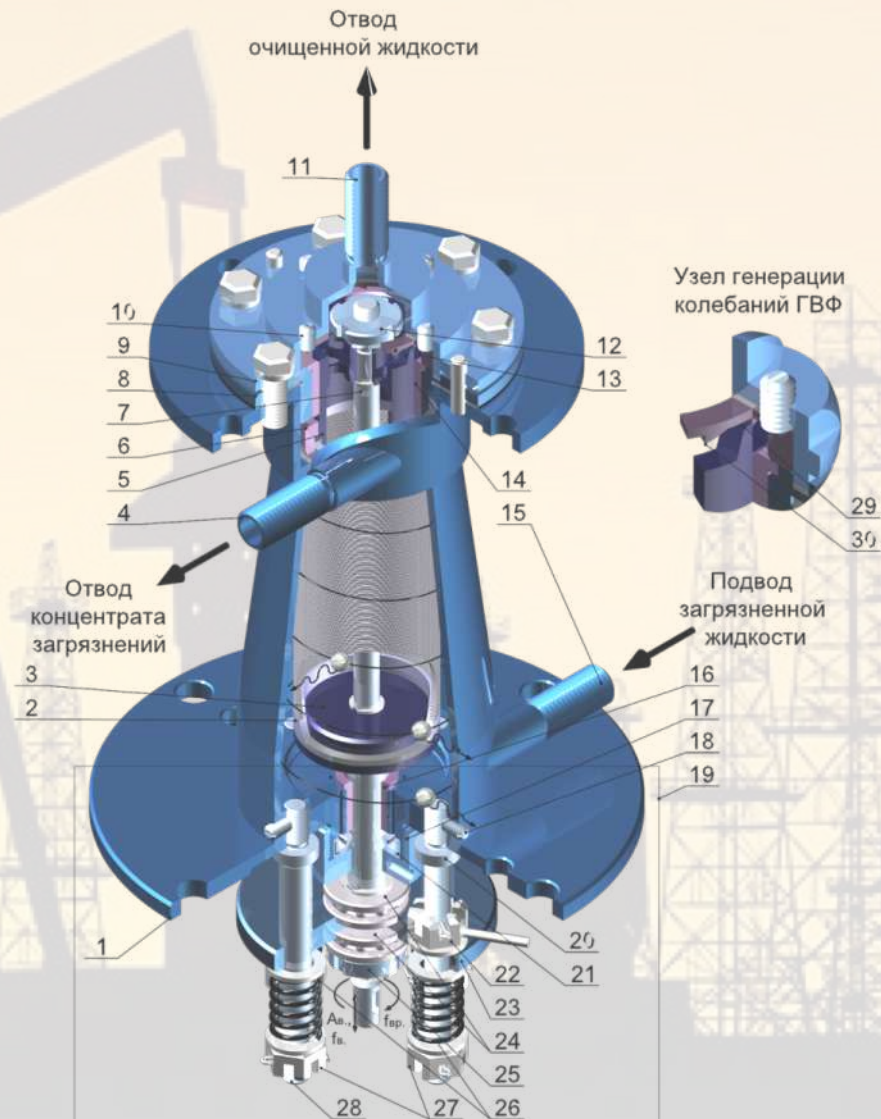
Hydrodynamic vibration oil filtering

Description

- Centric forces enhances hydrodynamic removal of contaminant particles from filter
- Vibration enhances adsorption and prevents fouling of the filter

Application

- Heavily polluted waste waters, non-Newtonian liquids
- Oils and greases
- Liquids contaminated with oils
- Liquid polymers, lacquers
- Paints and primers



2. Raw Resources Management

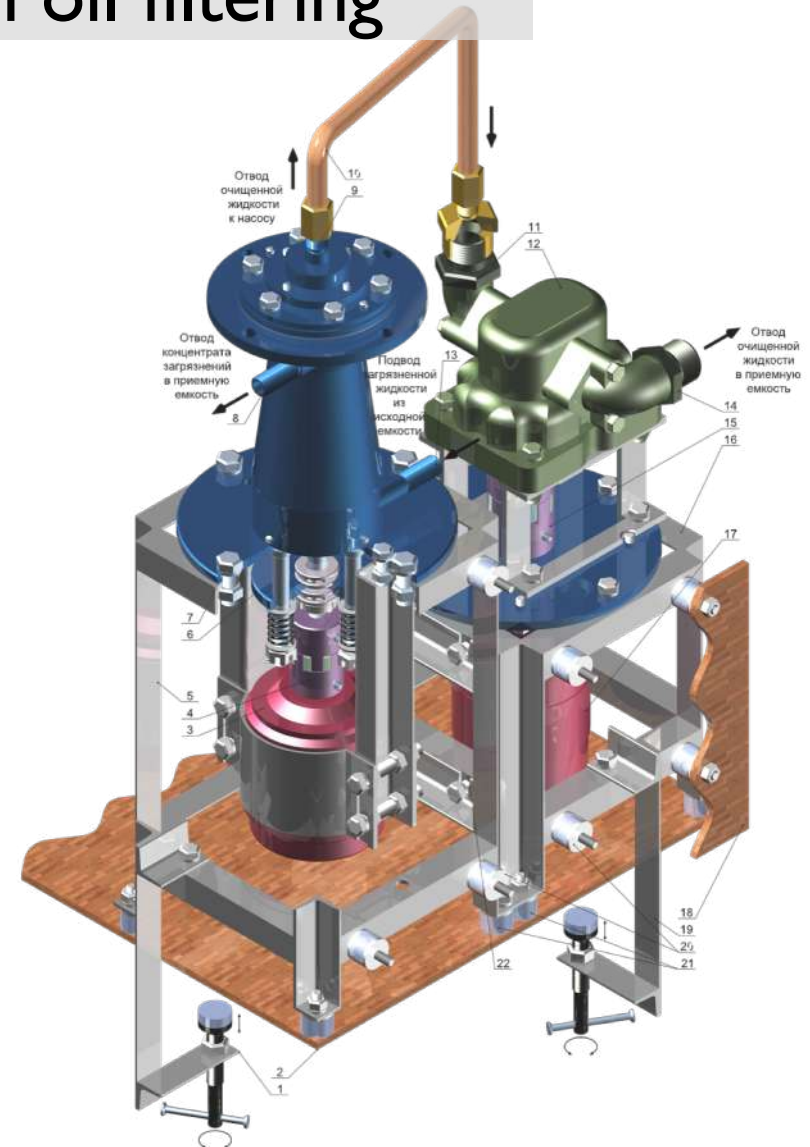
Hydrodynamic vibration oil filtering

Advantages

- Stable treatment efficiency
- Constant pressure loss on filter
- Treatment efficiency may be changed without filter replacement
- Enhanced MTTF without filter replacement
- Lowered cost of usage
- May be installed in the existing treatment lines to improve their efficiency.

Design phase

- The technology may be introduced after adaptation to a certain treatment line



2. Raw Resources Management

Associated natural gas production with a vortex pipe

Application

- Low temperature lines for natural gas production
- Lines for gas treatment in chemical industries where it is normally burned out

Advantages

- Reduced losses of associated natural gas
- Improved ecological efficiency of chemical plants
- Enhanced economical efficiency of chemical plants



2. Raw Resources Management

Combined Porous Filtering Materials

Application

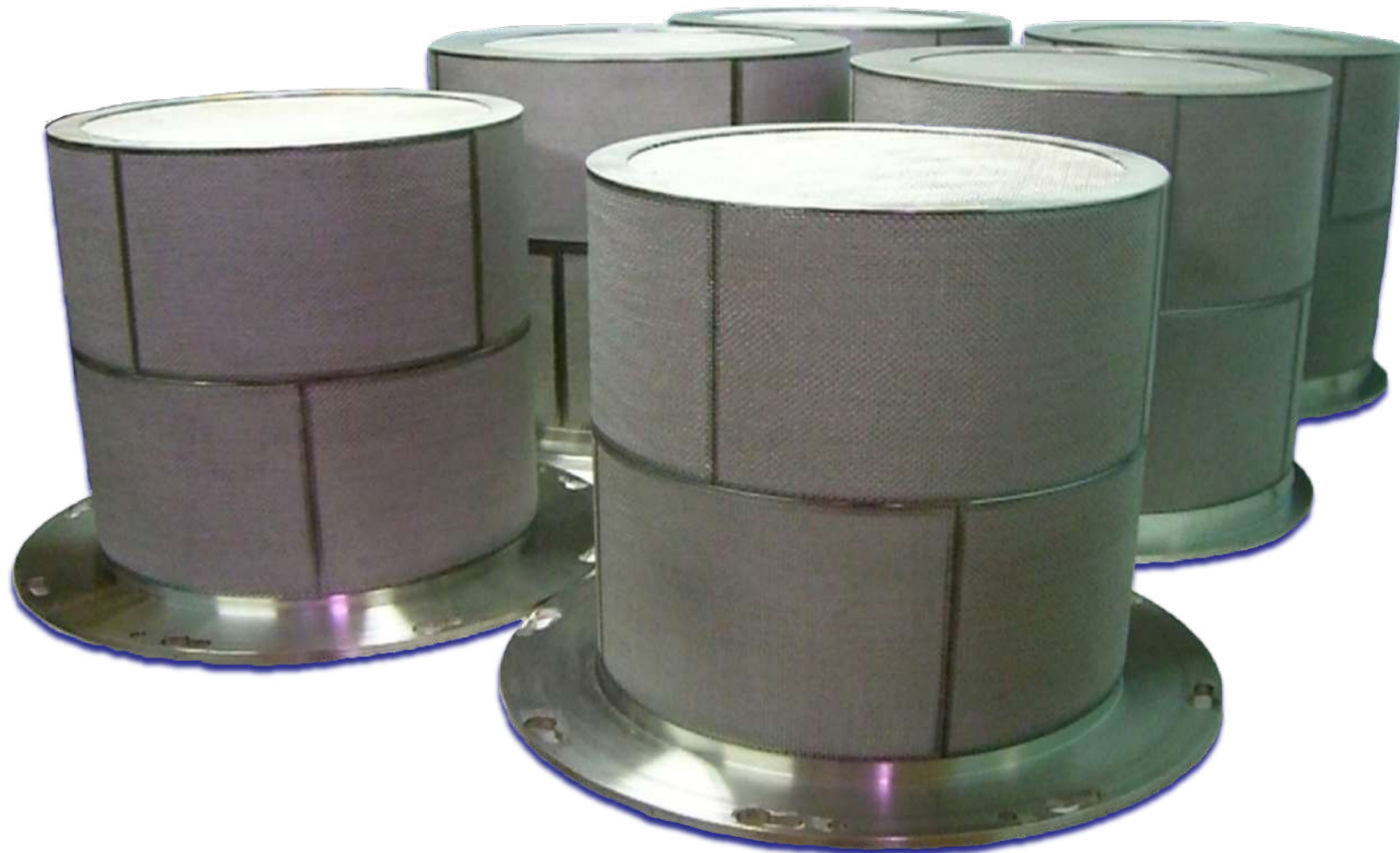
- Aero-Space Industry
- Oil- and Gas refinery
- Chemical and nuclear industry
- Medical equipment

Advantages

- High reliability
- In case of high pressures maintain their properties
- High working range (temperature, load, pressure)
- High efficiency



Applications of “Combined Porous Filtering Materials” Filters for Gas Station Tanks (Automotive and Railroad)



Applications of “Combined Porous Filtering Materials” Gas Separators



Particle size: $>2 \mu\text{m}$
Pressure: 8 MPA

Applications of “Combined Porous Filtering Materials” Filters for Oils and Gas Products Refinery in Pipelines



3. Environment Monitoring



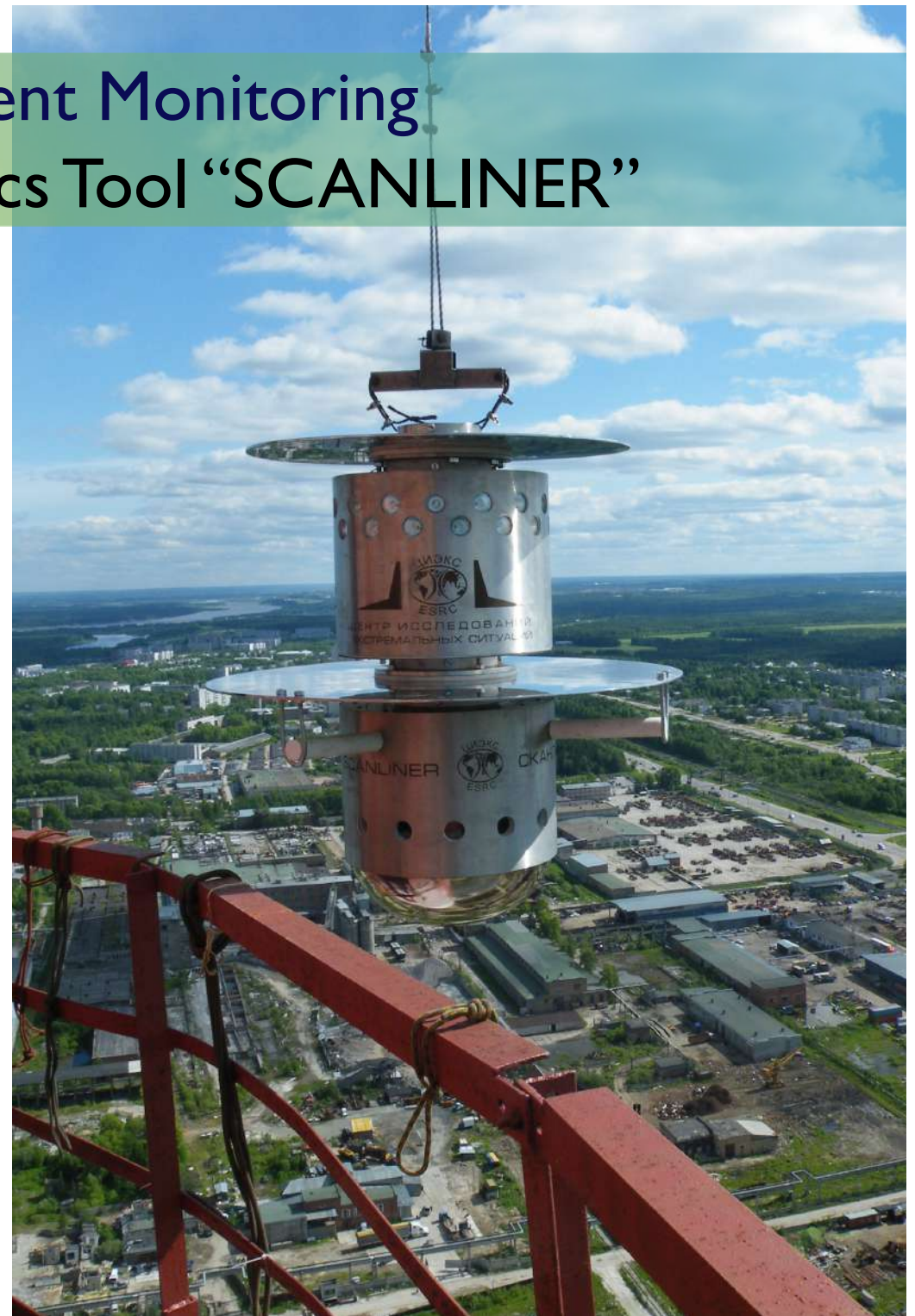
3. Environment Monitoring: Chimney Diagnostics Tool “SCANLINER”

Application

- On-the-go diagnostics of industrial plants' chimneys lining

Advantages

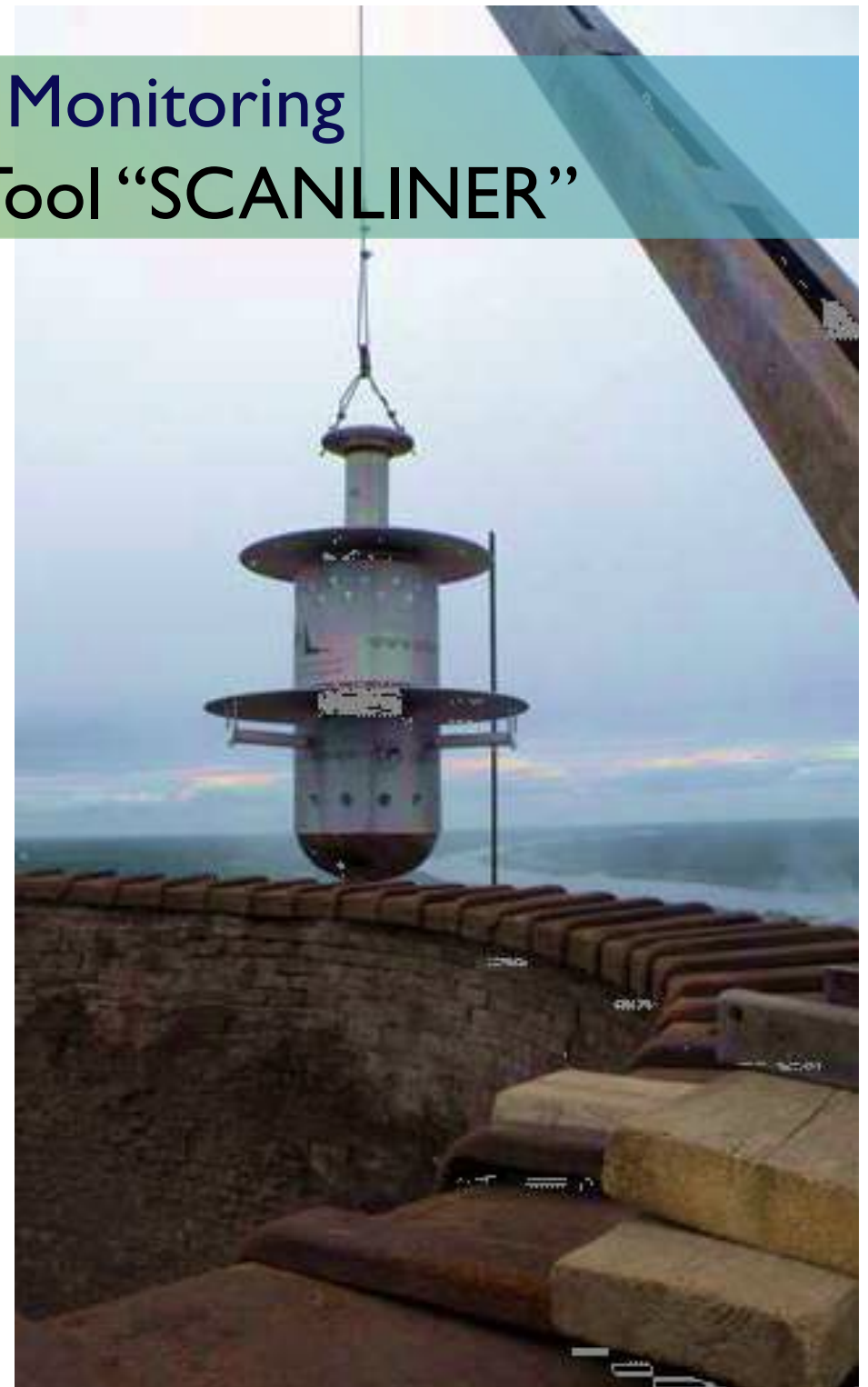
- Unmanned process
- The diagnostics process can be performed without shutting down the plant
- Aerodynamic stabilization in a flow of gases
- Opto-laser scanning
- Thermoresistant body
- 16 video cameras



3. Environment Monitoring Chimney Diagnostics Tool “SCANLINER”

Key performance parameters:

- Max height of inspected chimneys: 400 m
- Min diameter of chimneys: 1,2 m
- Max temp. inside the chimney: 300 °C
- Scanning rate: 10 m/min
- Lining defects resolving power: 2 mm
- Device dimensions: 1 x 1,2 m
- Weight: 120 kg



4. Alternative Energy



4. Alternative Energy

Diesel Engine Converted to Produce Energy from Biogas

Application

- Agriculture (Biogas produced from bio products degradation)
- Gas refineries
- Private houses

Advantages

- Easily switched for use with propane-butane, biogas, natural gas
- CO_x and NO_x discharged is lowered by up to 20%
- Efficiency: up to 36kW
- Patented fuel pumping system





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