

**MECHANICAL TREATMENT OF WASTE WATER.
EFFICIENT SOLUTIONSON RETENTION OF
FIBROUS INCLUSIONS AND SMALL RUBBISH.
EXPERIENCE OF IMPLEMENTATION**

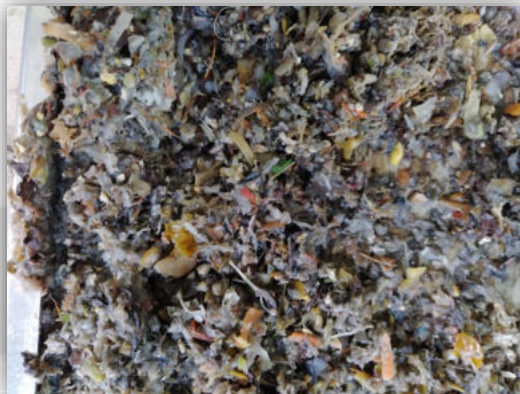
TWO-STAGE COMPLEX FOR MECHANICAL WASTEWATER TREATMENT «MY MET»

Modern problems of mechanical treatment:

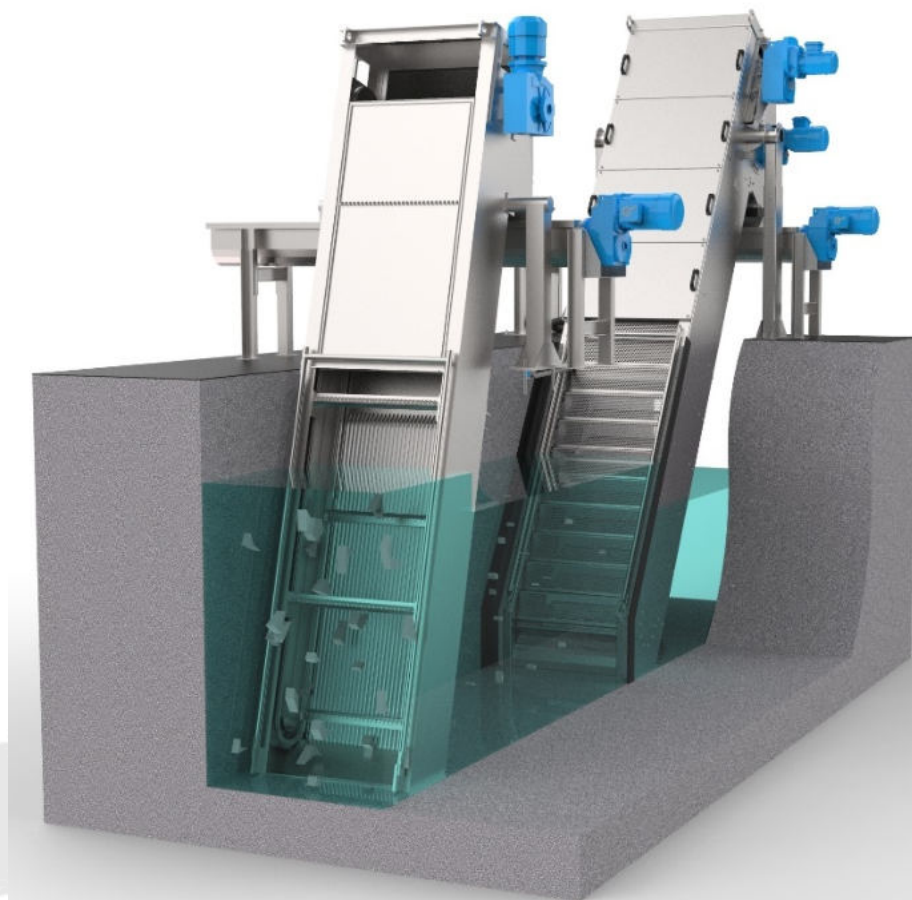
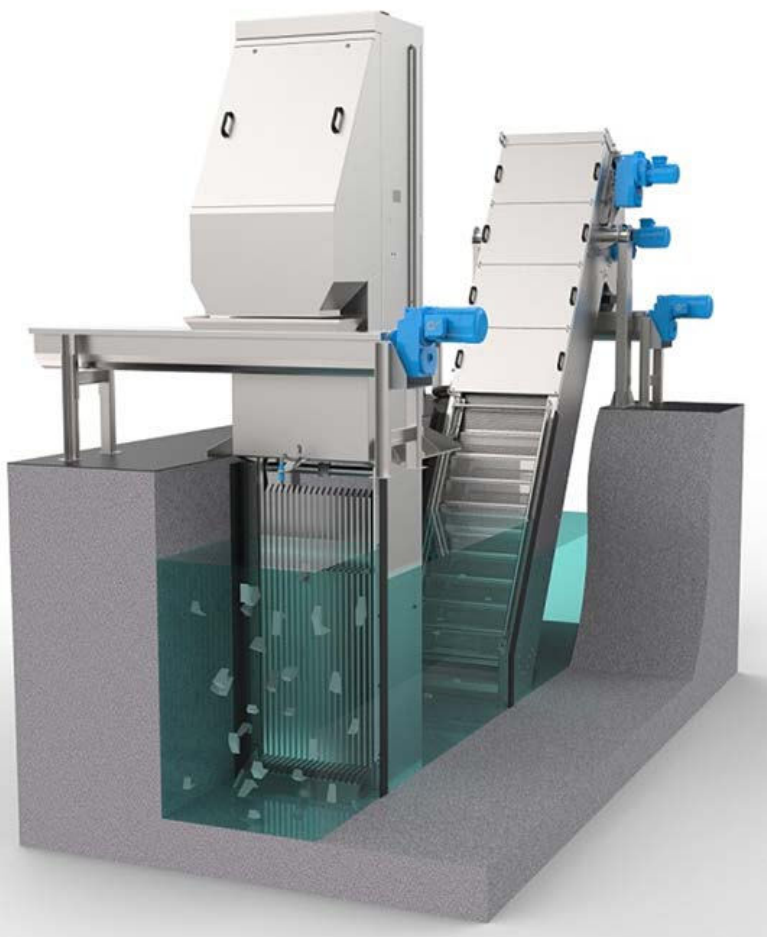
- Recently it has been decreasing of volume of domestic wastewater, at the same time, concentration of pollution and content of "waste" are increasing.
- Existing solutions for primary mechanical wastewater treatment cannot cope with increased load, and following treatment stages also cannot cope with this task: grit separator and primary sedimentation tanks.
- As a result most of these inclusions fall into aeration zones, secondary sedimentation tanks, which leads to siltation, malfunction of existing equipment.
- Fibrous "twisted" inclusions do not lend themselves to grinding, which leads to Stop operation of the WWT and its complete cleaning with emptying.
- Negative effects of floating inclusions such as cotton swabs and hair, which destroy UFO lamps.

Modern problems of mechanical treatment:

- Large-fiber inclusions in a huge amount, twisting into "twists", "ropes": napkins, nonwovens, hygiene items, etc.
- Fine debris that cannot be removed with most existing mechanical screens.
- Big amount of preservation products, fruit seeds, cotton swabs, hair and other inclusions less than 5 mm



Complexes of mechanical treatment "MY MET", performing two-stage wastewater treatment

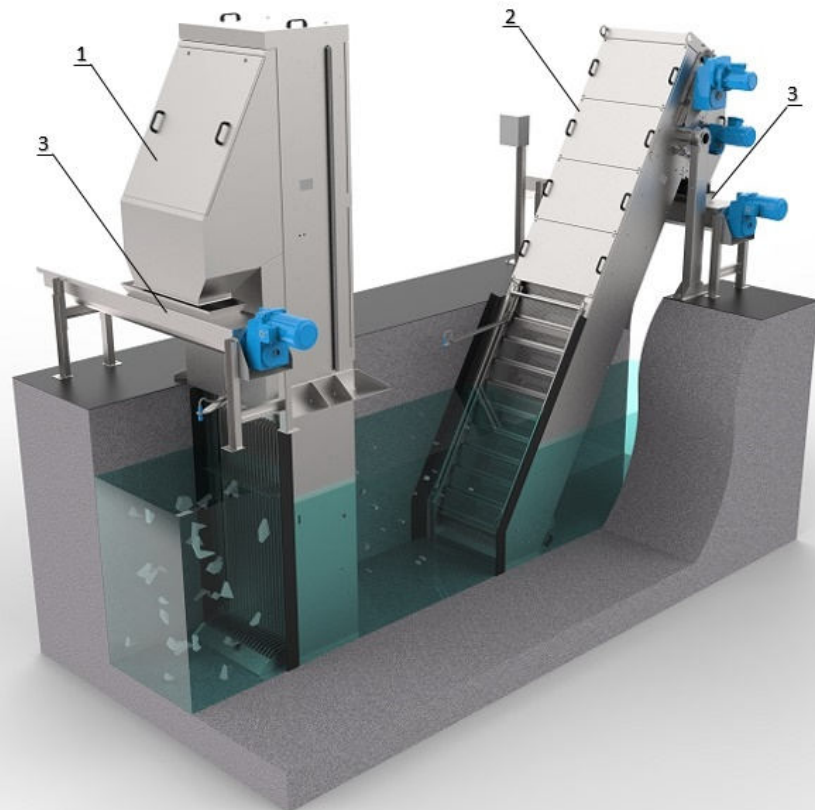


Composition of RVGO + ERPE complex

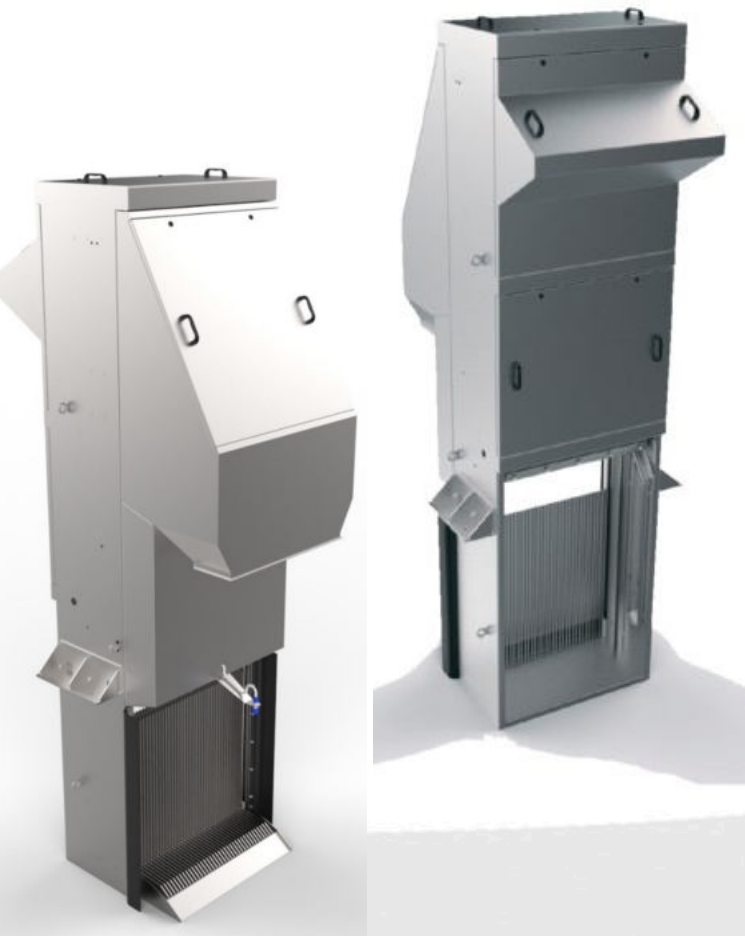
Complex consists of two screens installed consistently in the channel:

- RVGO bucket-type coarse cleaning screens (1), which captures large impurities, with gap of 20-35 mm;
- fine cleaning gratings ERPE with an endless stepped perforated screen (2), catching fine dirt, gap of 2-6 mm.

Waste can be discharged from the ERPE and RVGO screens either into conveyors (3), or directly into squeezing press, or into container. ERPE grid is equipped with system of periodic washing of filter screen, water from which enters conveyor together with the waste, therefore, when using conveyor. Press must be installed after it to dehydrate the waste. When installing a common conveyor under more than three ERPE screens, it is recommended to equip it with an additional water drainage section.

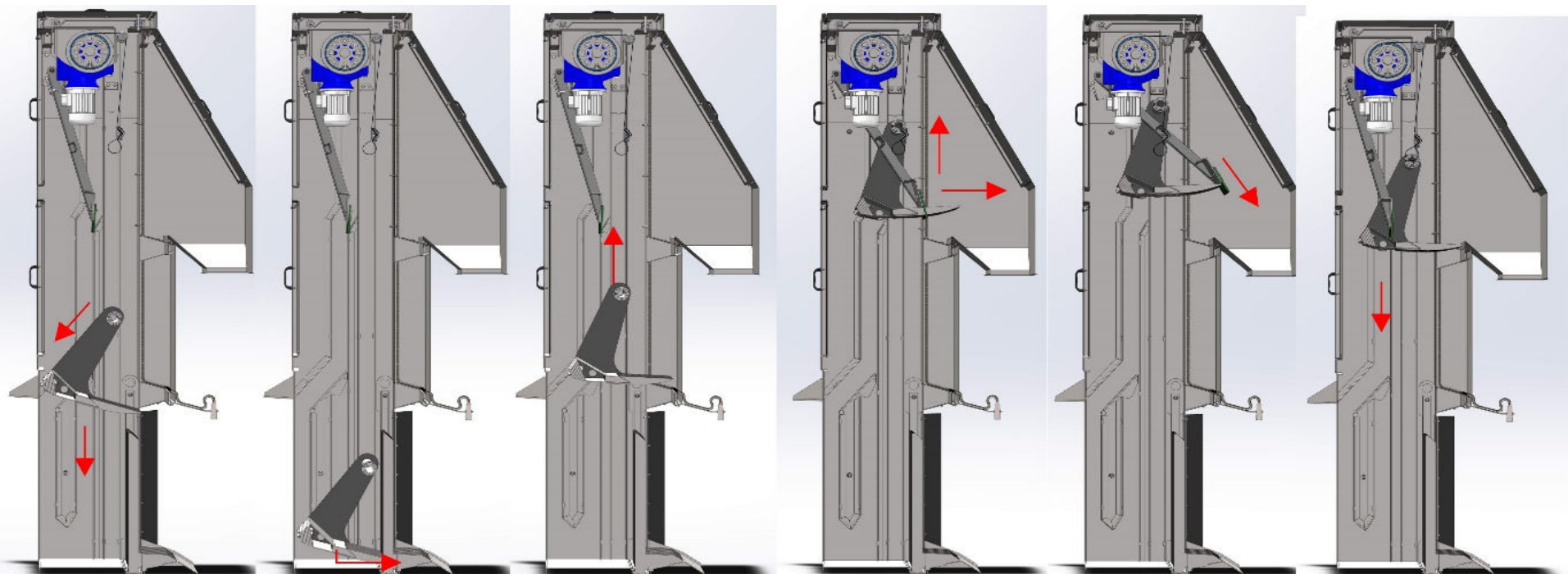


Bucket type RVGO screen



- Mechanical screen of pre-treatment RVGO bucket type is intended for pre-treatment of waste water from mechanical impurities at the sewage pumping station and water treatment facilities of municipal and industrial enterprise.
- RVGO bucket-type reverse rake screen has a simple design, has no chains, takes up little space in the channel, and structurally allows you to extract large inclusions from wastewater.
- Filter screen is cleaned by a toothed bucket in the direction of reverse flow of water, and collected waste is discharged in front of screen above untreated drain.
- Screen can be operated in manual or automatic mode. In automatic mode, screen operates from the water level in front of screen and by timer.
- Gaps of the RVGO screen when used in complex should be in the range from 20 mm to 35 mm, depending on the perforation of the ERPE screen.

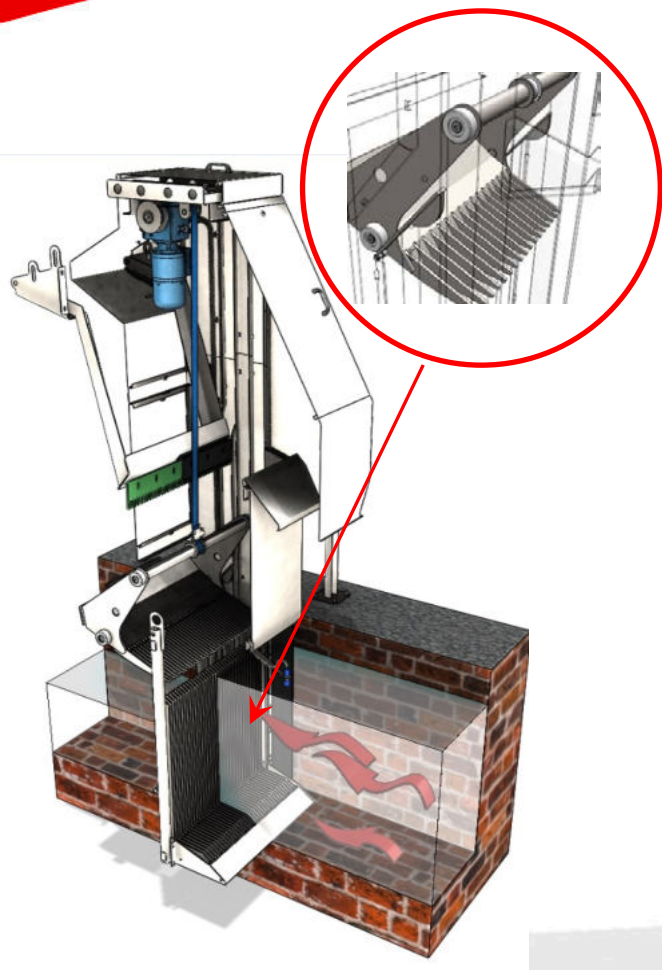
Cycle of operation of RVGO bucket-type screen



RVGO bucket screen



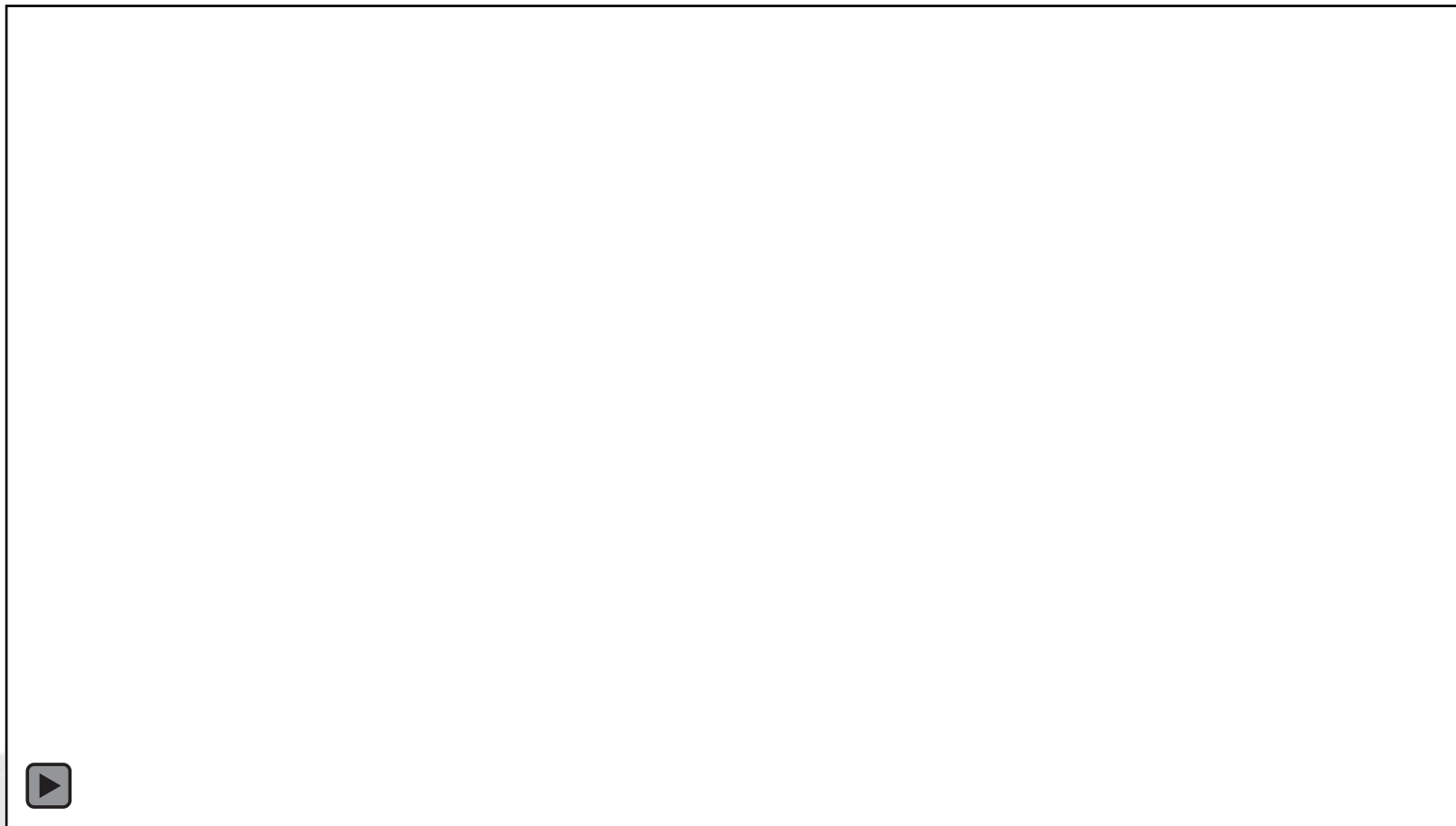
Advantages of the RVGO screen



**IDEAL FOR DEEP AND
WIDE CHANNELS**

- Reliable and efficient operation of screen due to cleaning of filter screen with bucket with teeth from the side of cleaned stream in the direction of uncleaned stream and discharge of the trapped waste over uncleaned stream.
- Design of bucket with long teeth allows you to remove large objects from wastewater, twisting fibrous impurities.
- No parts constantly rotating in the water, no chain - up and down movement of the bucket with combs is ensured by winding or unwinding of strong tape sling on the drum with drive.
- Possible unloading heights - up to 25 m.
- Simplicity of design ensures reliability of operation of all units and mechanisms of the screen and, as a consequence, low operating costs.
- Two-stage protection of parts from destruction in emergency situations - electronic by current and mechanical due to the torque limiting clutch built into the drive.
- Possibility to lift the filter screen with a bucket above the channel with standard drive

Operation of RVGO bucket-type screen

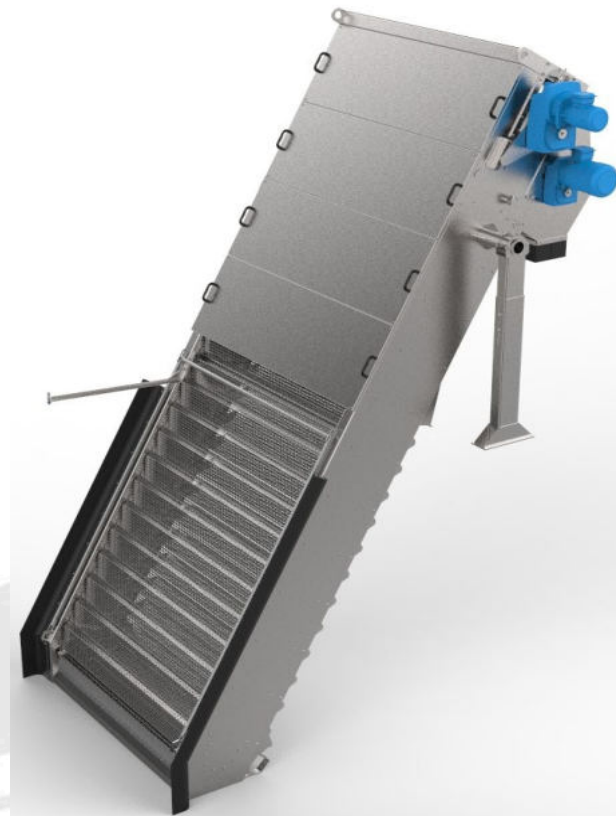


ERPE fine cleaning screen with stepped perforated screen

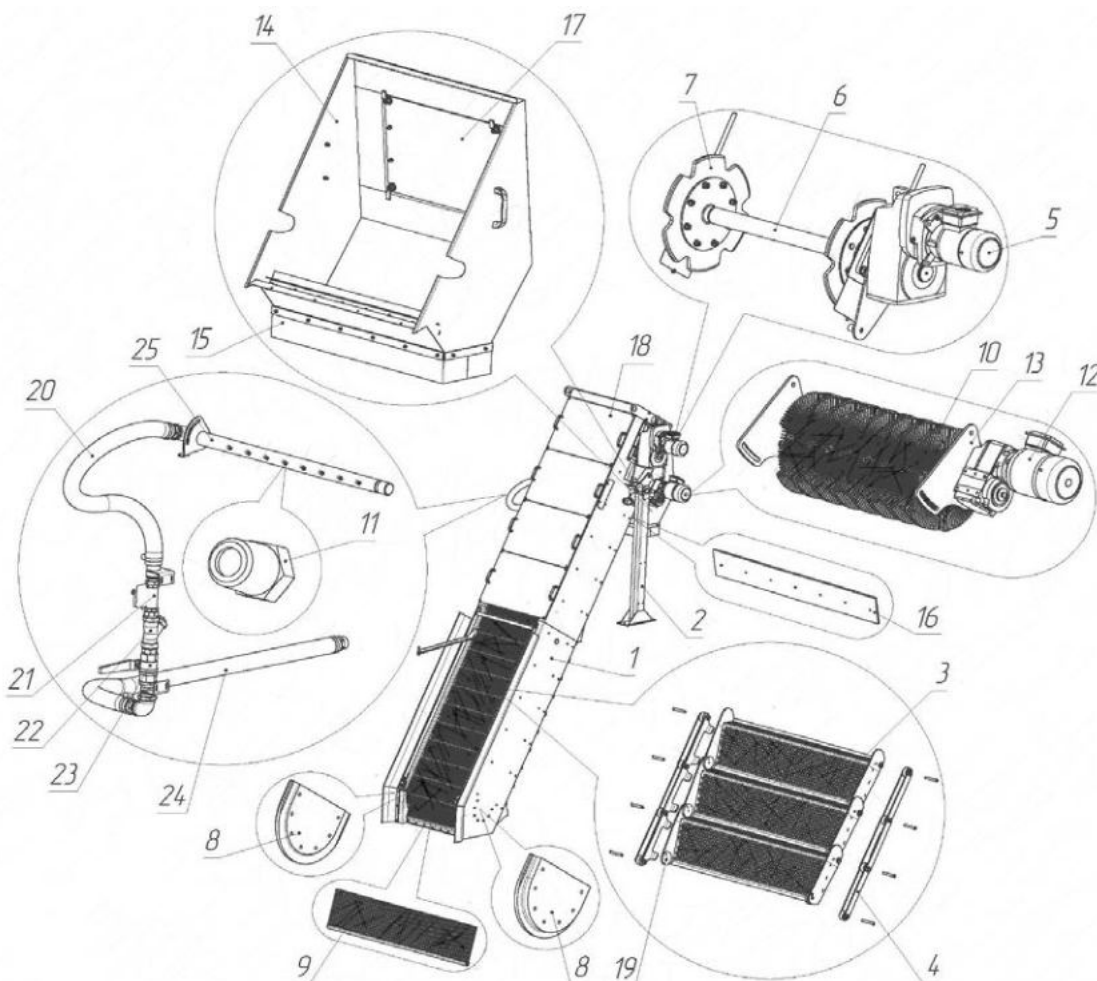


- ERPE screen with an endless perforated screen is designed for fine mechanical wastewater treatment at treatment facilities.
- Installed in the channel at an angle of 60° on swivel supports, which are fixed to the channel sides with anchors. Traverse is provided to raise the screen to horizontal position above the service channel.
- Filtering screen is made in the form of stepped perforated panels that rotate parallel to the flow when moving from the rear side of the grate.
- Screen is cleaned with cylindrical brush and washed periodically. Treatment is discharged from the back of the screen.
- Screen can work in manual or automatic mode. In automatic mode, screen operates from value of the difference of water levels in front of and behind the screen, and by timer.
- Degree of cleaning depends on perforation of the filter screen and it can be from 2 to 8 mm.

ERPE screen general view



Appliance of ERPE screen



- 1) Frame; 2) Swivel supports;
- 3) Perforated panels;
- 4) Roller chains;
- 5) Screen drive;
- 6) Drive shaft;
- 7) Sprockets;
- 8) Bottom guides;
- 9) Belt brush;
- 10) Cylindrical brush;
- 11) Nozzles;
- 12) Brush drive;
- 13) Adjustment unit;
- 14) Removable cover;
- 15) Slide-ways;
- 16) Rubber scraper;
- 17) Hatch; 18) Cover; 19) Overlays;
- 20) Connecting hose;
- 21) Electromechanical tap;
- 22) Screen filter; 23) Tap;
- 24) Hose; 25) Flush manifold.

Main problems of ribbon screens



Most perforated screens designs are prone to very small build-up on the back of the filter panel



Consequences of poor-quality cleaning of the pre-treatment screen

Advantages of ERPE screen:

PERFECTLY REMOVES FIBROUS AND SMALL CONTAMINATIONS, HAIR



- Stepped shape of the perforated panels increases productivity, reduces hydraulic resistance and removes large objects from the water.
- Perforated panels on the back of screen are positioned parallel to the flow, which reduces hydraulic resistance and prevents accumulation of small waste inside the screen.
- Design practically does not limit channel depth, channel width is up to 3m.

Features of ERPE screen



Perforated step filter screen



Fine cleaning ERPE screen



Brush area



Garbage retention qualityn

Operation of the fine cleaning ERPE screen



Related equipment of complexes



Screw conveyors



Screenings press



RGO + ERPE complex

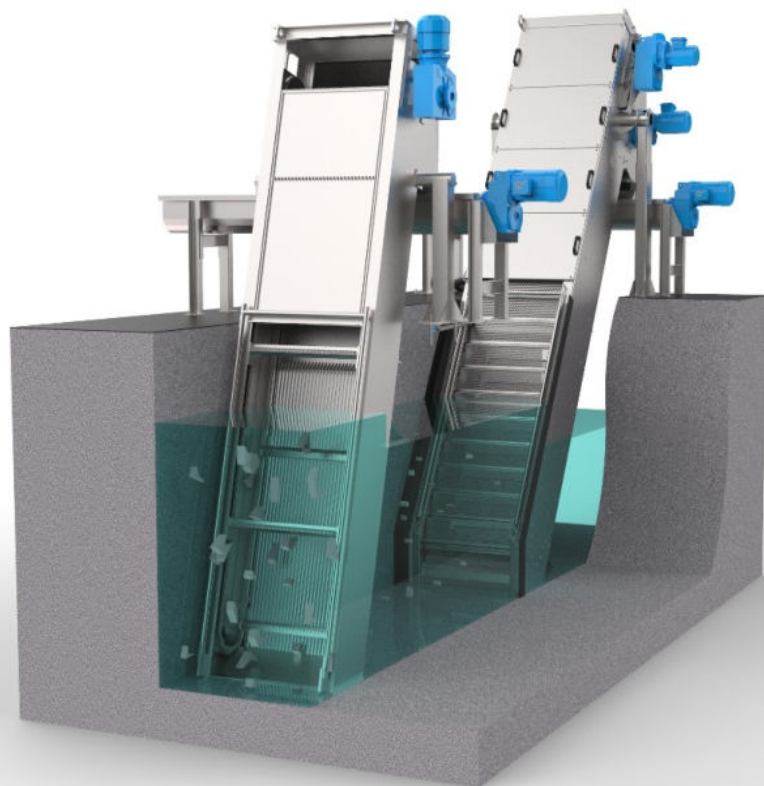
Complex consists of two gratings installed in the channel in series:

- Screens of pre-treatment, rack and pinion rake type RGO, catching large contaminants, gap of 16 mm;
- Fine cleaning screens ERPE with an endless stepped perforated screen that captures very fine dirt, gap of 2-6 mm.

Mechanical treatment complex RGO + ERPE is well suited for treatment facilities of average productivity, where not very large part of fibrous inclusions which present in the wastewater.

Main purpose of installation of this complex is to extract fine waste from wastewater, thereby improving the technological process of wastewater treatment at other stages.

Allows to minimize the amount of wet sludge, or in certain cases, even eliminate the stage of primary settling.



Rack screen rake type RGO

Rack screens are used to retain coarse impurities from wastewater with their subsequent extraction.



ADVANTAGES:

- Screen frame, chain, filter screen and other elements are made of corrosion-resistant AISI 304 steel and wear-resistant polymer materials with a low coefficient of friction.
- Filter screen and tine arms are collapsible, which makes it possible to replace without dismantling the screen or its units.
- Original design of roller chain allows to operate without repair for 6-8 years.
- Intelligent automatic filter screen clogging system.
- Cleaning filter screen to its full depth increases the cleaning efficiency by 30-40%.

Mechanical cleaning complex of WWTP, Almet'yevsk



Mechanical treatment complex at Lyubertsy WWTP

Average productivity of complex is 180 000 m³/day.



Mechanical treatment complex at Lyubertsy WWTP

Average productivity of complex is 180 000 m³/day.



Operation of mechanical treatment complex at Lyubertsy WWTP



**COMPLEX SOLUTIONS
FOR MECHANICAL CLEANING
FOR SEWAGE PUMPING STATIONS**

Existing tasks and problems of the SPS

Existing tasks:

- Protection of expensive pumping equipment from breakdowns.
- Minimizing the human factor.
- Cutting costs.

Existing solutions:

- Crushing of inclusions in the channel - channel crushers.
- Removal of inclusions and subsequent disposal - mechanical screens.
- Removing inclusions with their subsequent crushing into the channel - mechanical screens and crushers of "dry execution".

Existing problems:

- Huge amount of fibrous inclusions in the sewer: napkins, rags, nonwovens, hygiene products, etc.
- Failure of existing equipment due to a large number of fibrous inclusions.
- Difficulty changing different types of equipment "mechanical protection", without significant construction changes or lack of possibility of applying existing solutions

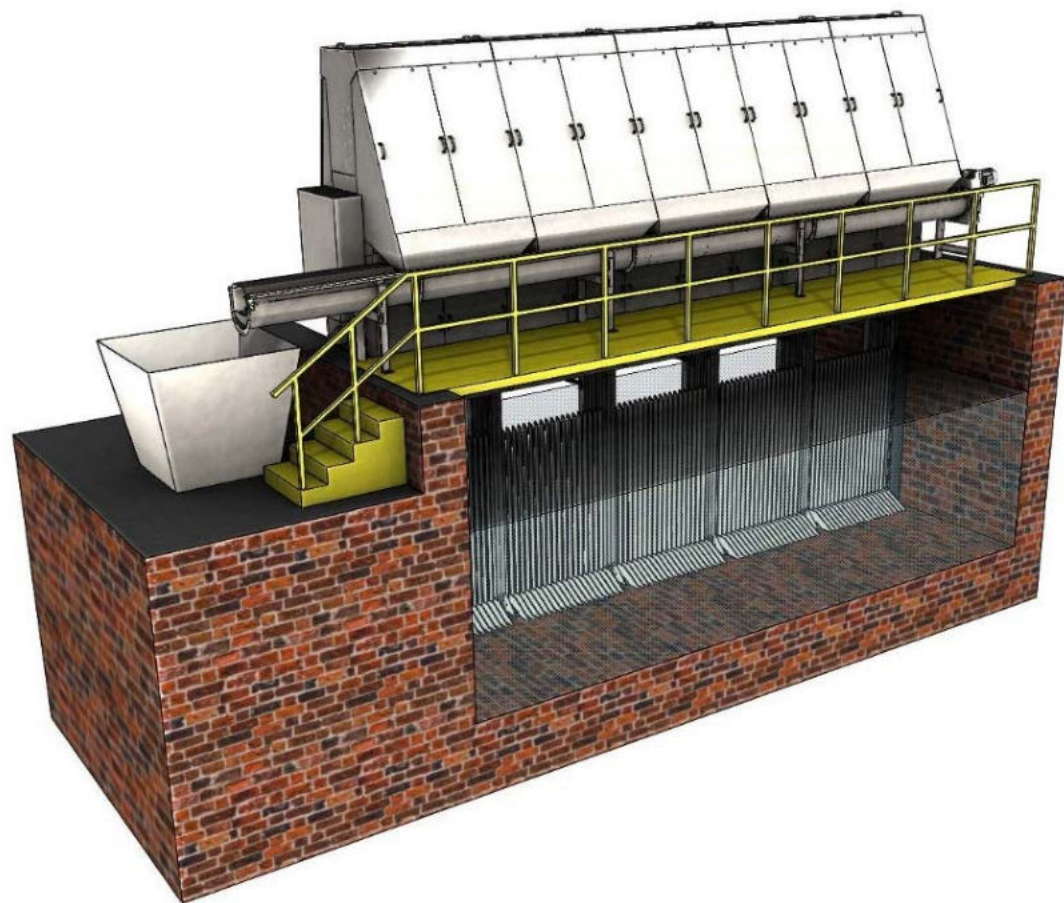
SPS problems



SPS problems. Complexity of placement



Complex solutions for mechanical cleaning for sewage pumping stations



RVGO bucket-type coarse screen

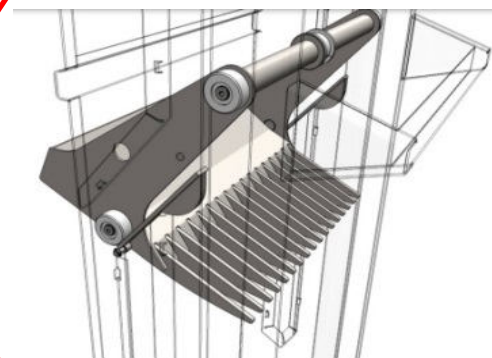
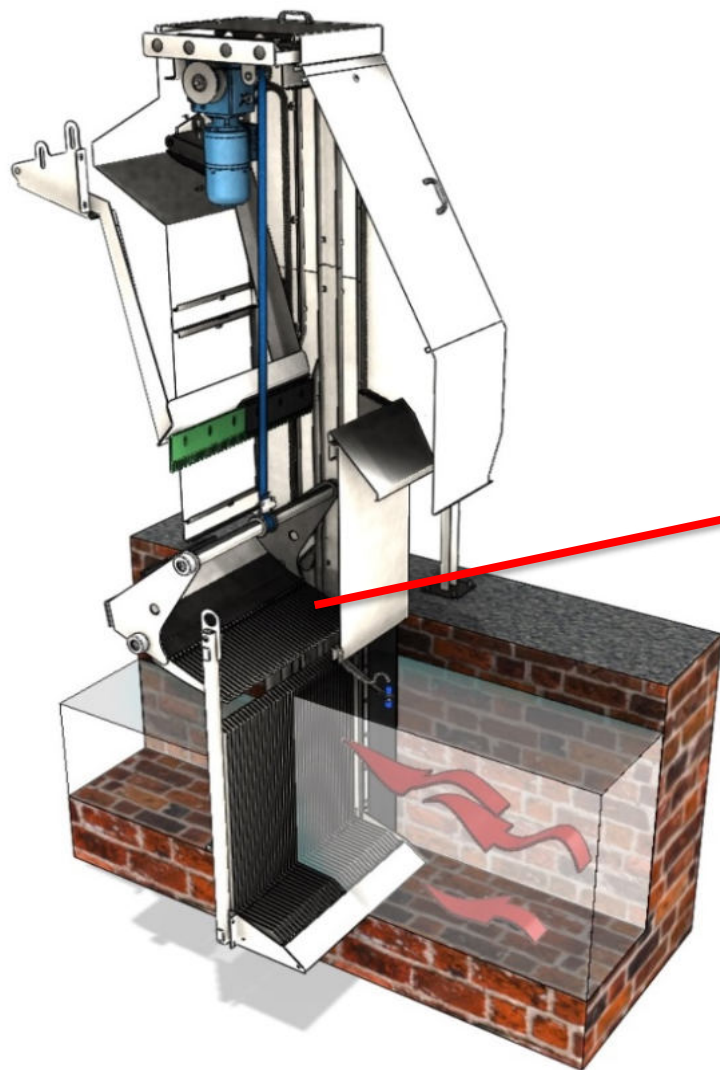
Designed for rough preliminary wastewater treatment from mechanical impurities.

ADVANTAGES:

- RVGO screen has a simple design, has no chains, takes up little space in the channel, structurally allows you to extract large inclusions from wastewater;
- Possible unloading height - up to 25 m;
- Filter screen is cleaned by bucket with teeth in the direction of reverse flow of water, trapped waste is dumped in front of screen above untreated drain;
- Gaps: from 20 mm to 50 mm;
- Ideal for deep and wide canals;
- Simplicity of design ensures reliable operation of all units and mechanisms of screen and, as a result, low operating costs;
- Possible to lift the filter screen over the channel without screen dismantling;
- Screen work is fully automated.



RVGO bucket-type coarse screen



RVGO bucket-type coarse screen



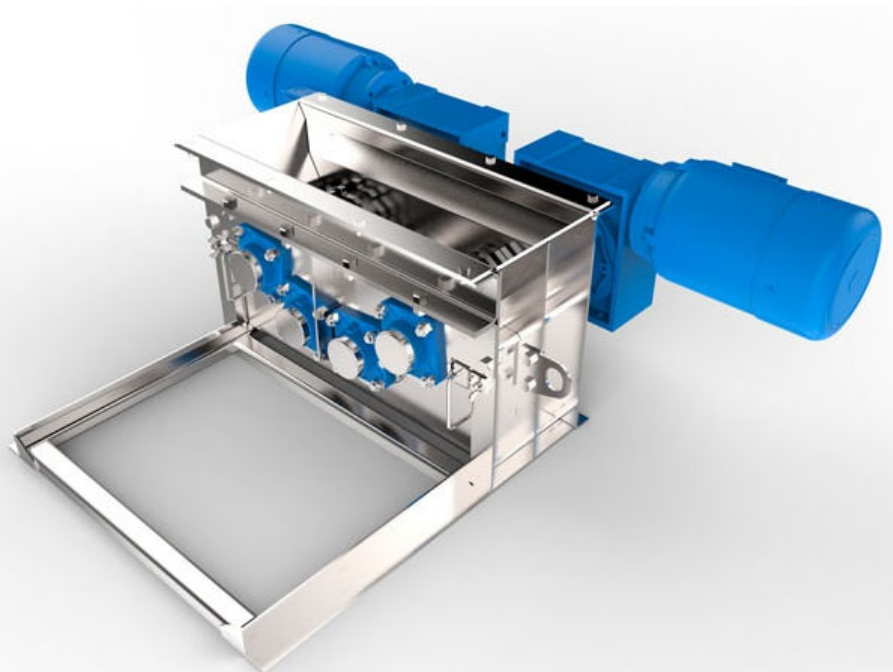
RVGO bucket-type coarse screen



EDO waste crusher

Crusher is used to crush waste removed from mechanized grates at sewage pumping stations.

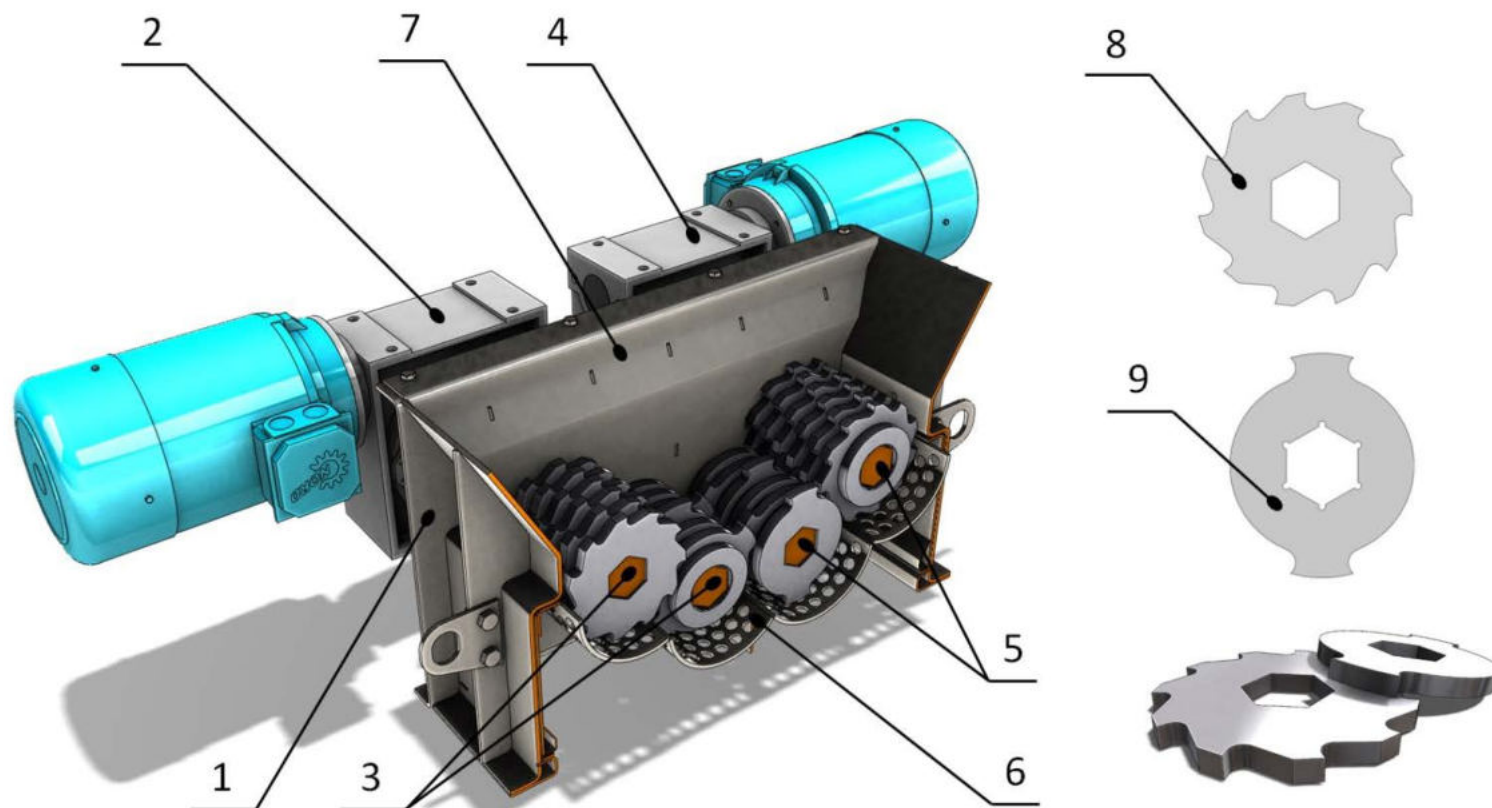
Main purpose is shredding napkins, rags, nonwoven products and others.



SPECIFICATIONS:

Parameter name	Unit.	Parameter value
Performance	m ³ /h	2
Capacity	kWt	8
Shredded waste fraction	mm	16

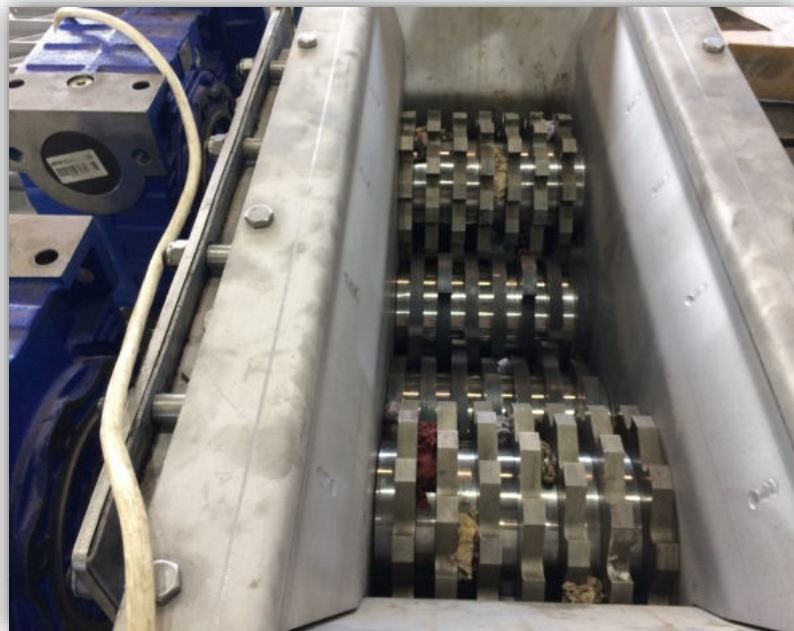
EDO waste crusher



EDO waste crusher device

1 – housing; 2 – drive of the first group of shafts with cutters; 3 – the first group of hex shafts;
4 – drive of the second group of shafts with cutters; 5 – second group of hex shafts;
6 – perforated sorting sieve; 7 – sludge discharge guide; 8 – auxiliary cutter; 9 – main cutter.

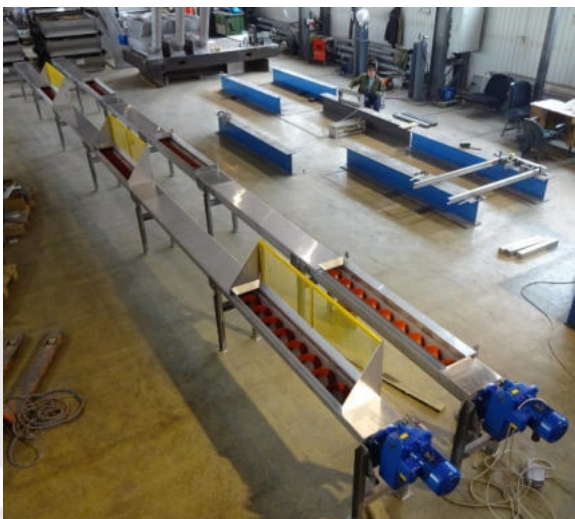
EDO waste crusher



EDO waste crusher working



Screw conveyor EVK

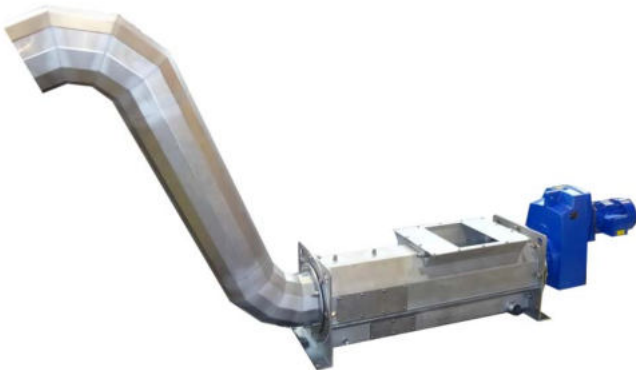


SPECIFICATIONS:

Parameter name	Unit rev.	Parameter value	
		EVK200	EVK300
Performance	m ³ /h	2	3...9
Screw diameter– D	mm	200	300
Nominal screw speed	rpm	21-23	11...26
Drive power rating	kWt	1,5...5,5	2,2...5,5
Transportation length	m	2...30	2...15
Overall dimensions	mm	567	663
Loading height (from floor to hopper)	mm	750...1100	
Angle of rise to the horizon during inclined transportation	degrees	35	

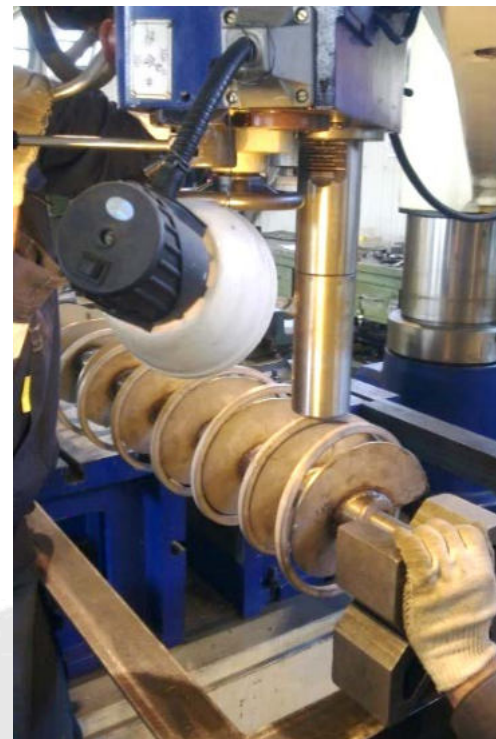
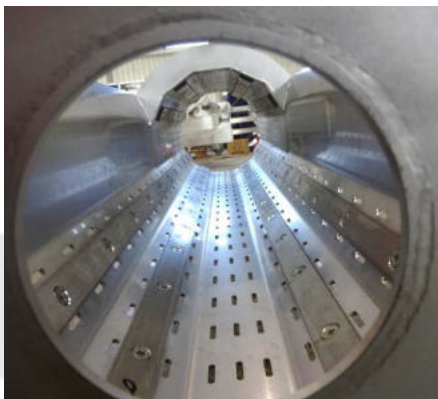
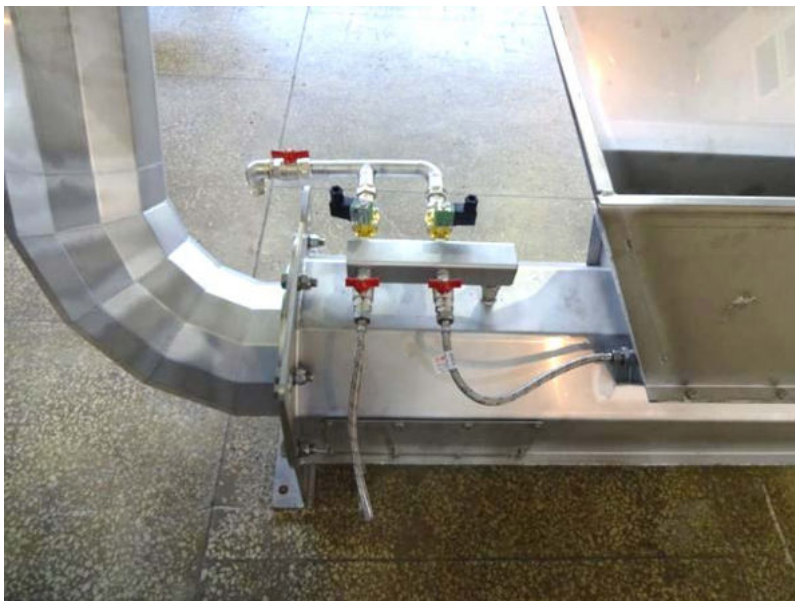
Screw washing press EPVP

SPECIFICATIONS:

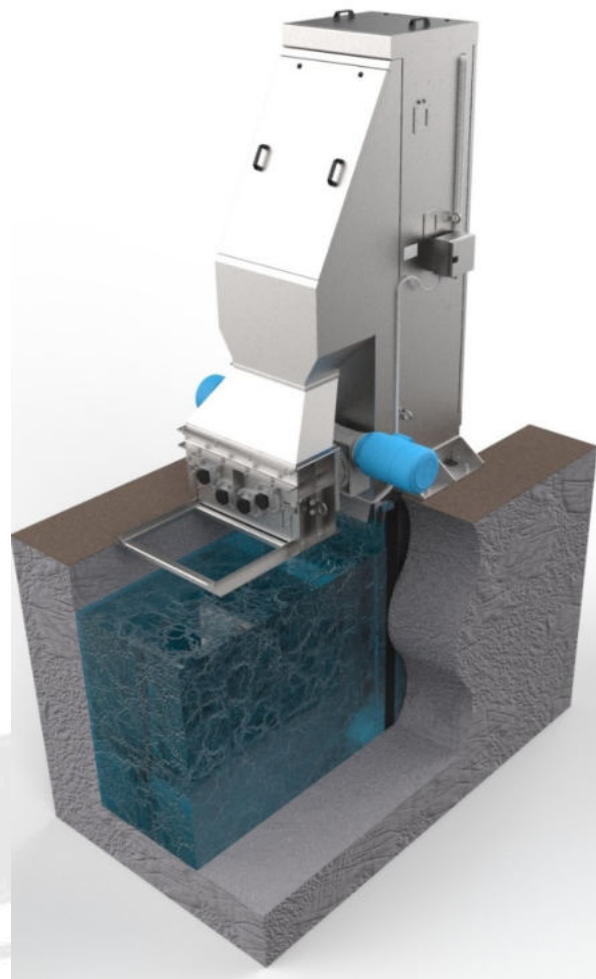
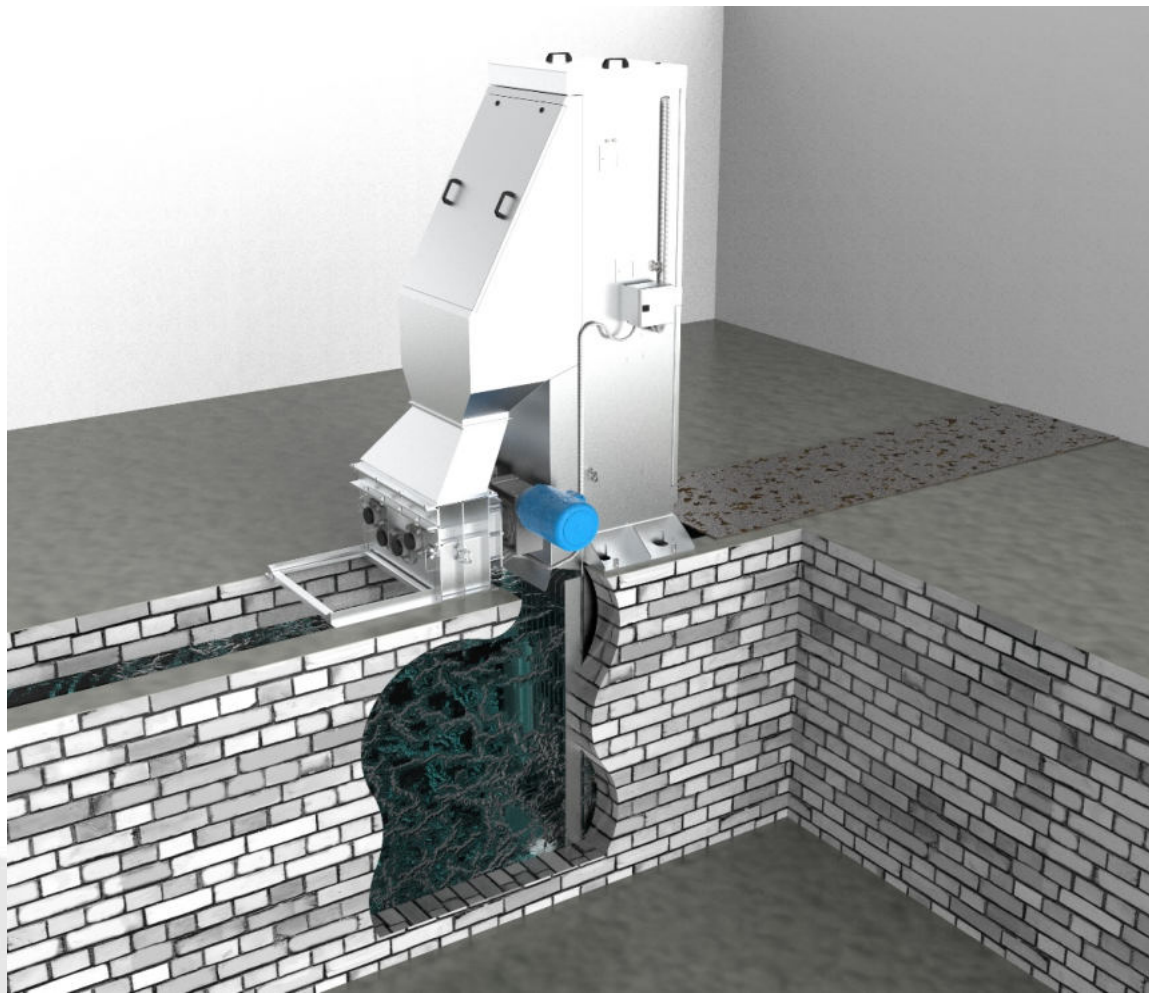


Parameter name			Unit rev..	Parameter value	
				2.220.500	2.220.1000
Max Performance			m³/h	2	
Nominal screw speed			rpm	9,4	
Drive power rating			κWt	2,2	
Screw diameter– D			mm	220	
Service water pressure			Bar	3-5	
Weight			kg	325	365
Dimensions	Overall length, L		mm	3050	3550
	Overall width, B		mm	490	
	Overall height, H		mm	1660	
	Loading window length, L1		MM	600	1100
	Loading window width, B1		mm	450	
	Loading height, h1		mm	470	
	Unloading height, h2		mm	1350	
	Connecting dimensions	L2	mm	1235	1735
		L3	mm	1275	1775
		B2	mm	350	
B3		mm	420		

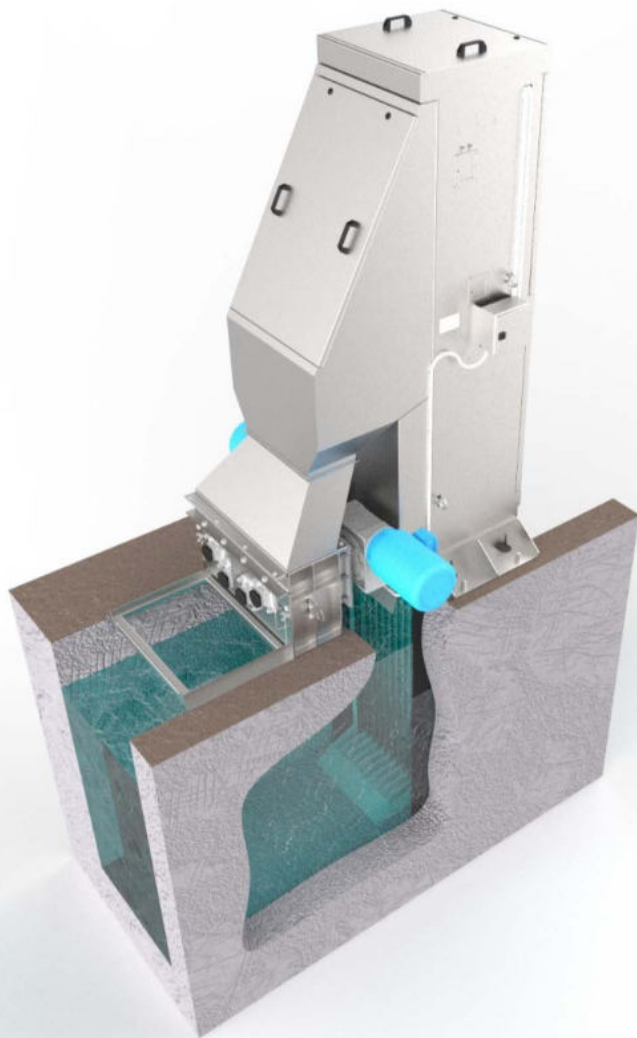
Screw washing press EPVP



Complex of mechanical cleaning RVGO + EDO



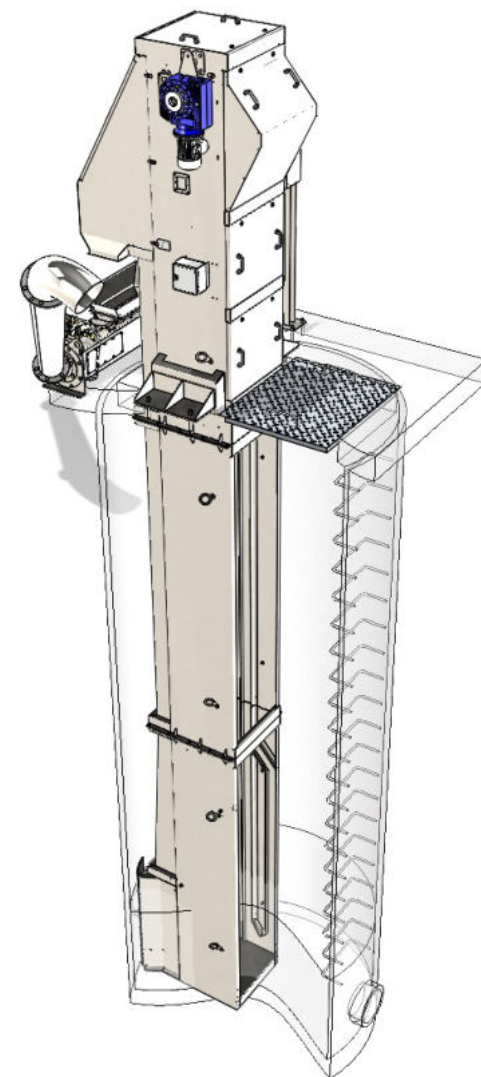
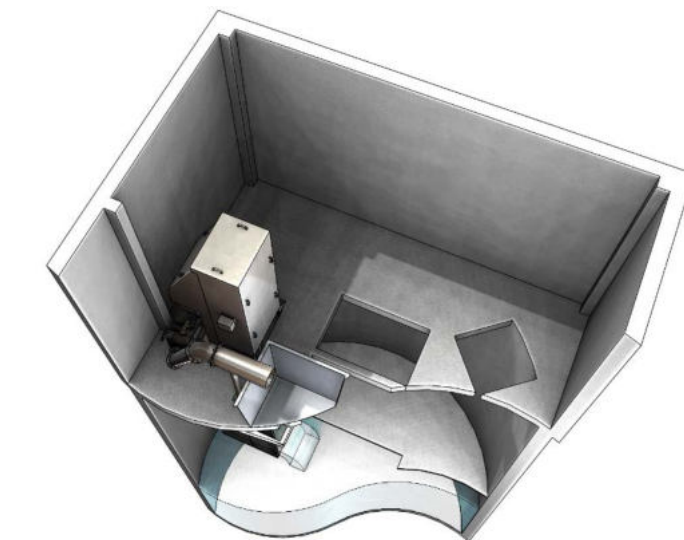
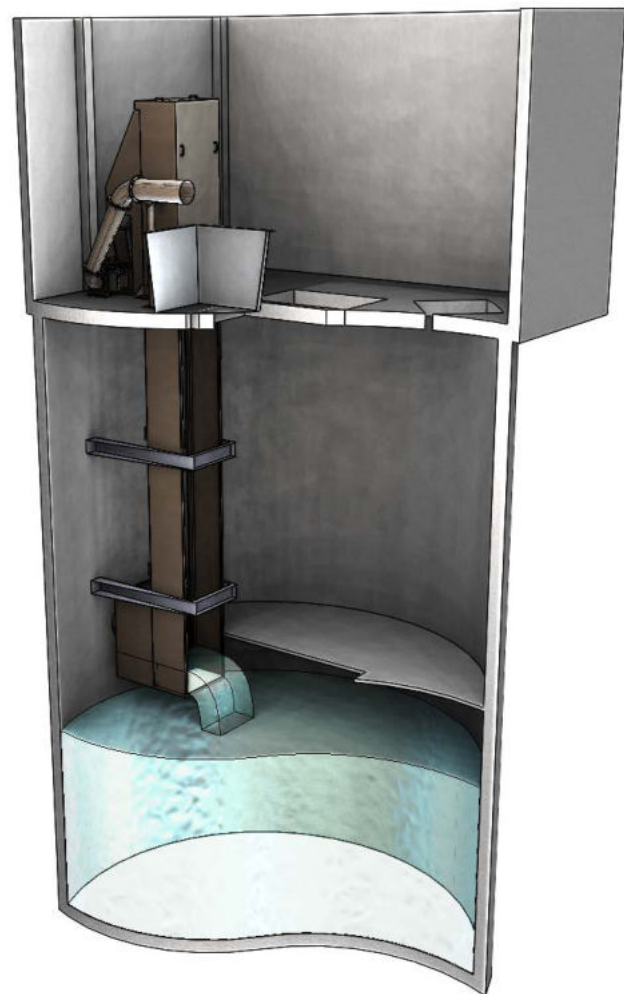
Complex of mechanical cleaning RVGO + EDO



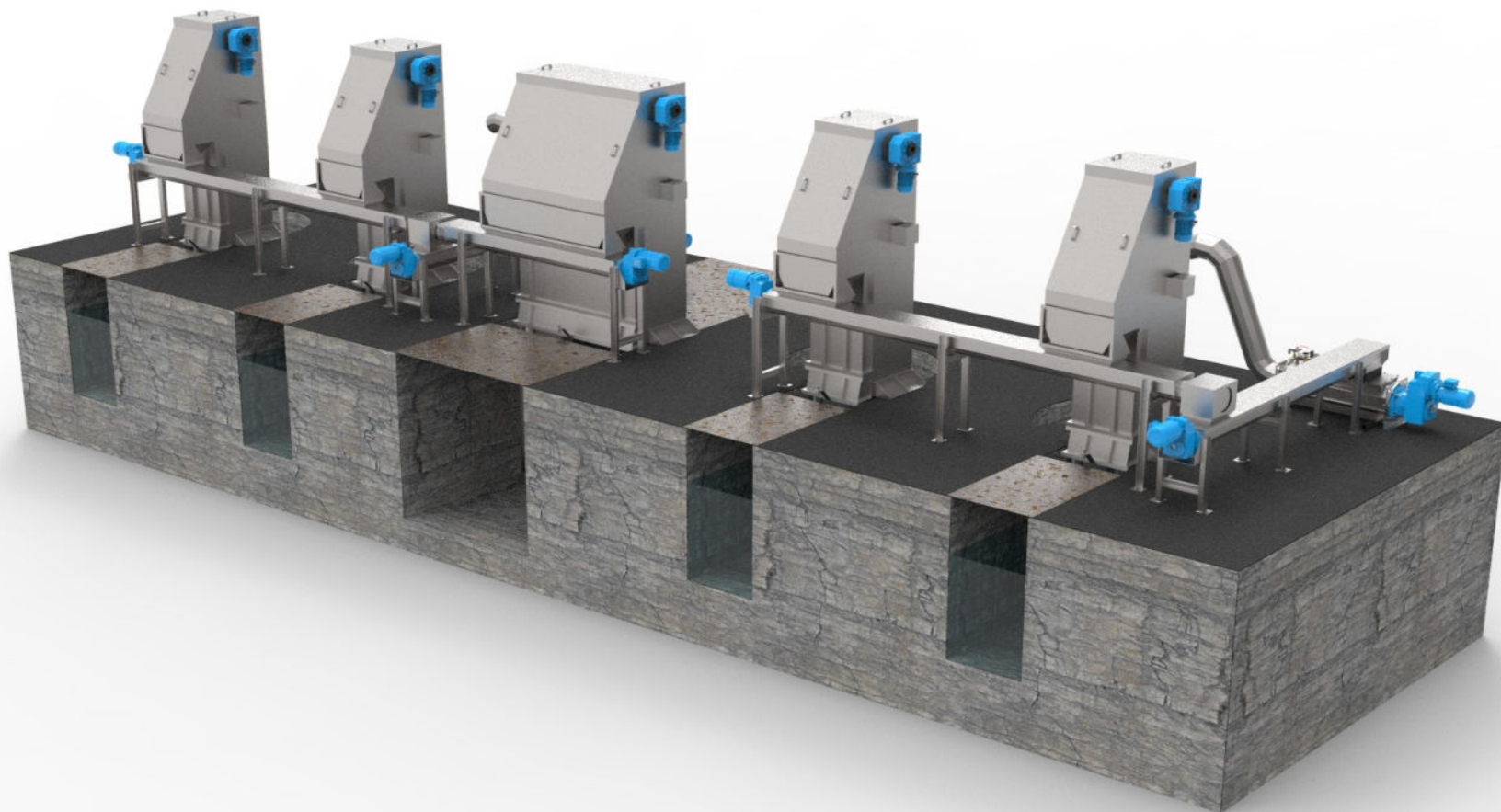
ADVANTAGES:

- Minimization of pieces of equipment.
- Possibility of installation in a confined space without significant changes in design of the pump station.
- Ability to install at station without constant presence of people, use "mobile brigades".
- Ability to continue work in case of failure of crusher, organization of unloading into a temporary container.
- Minimizing the spread of odors.

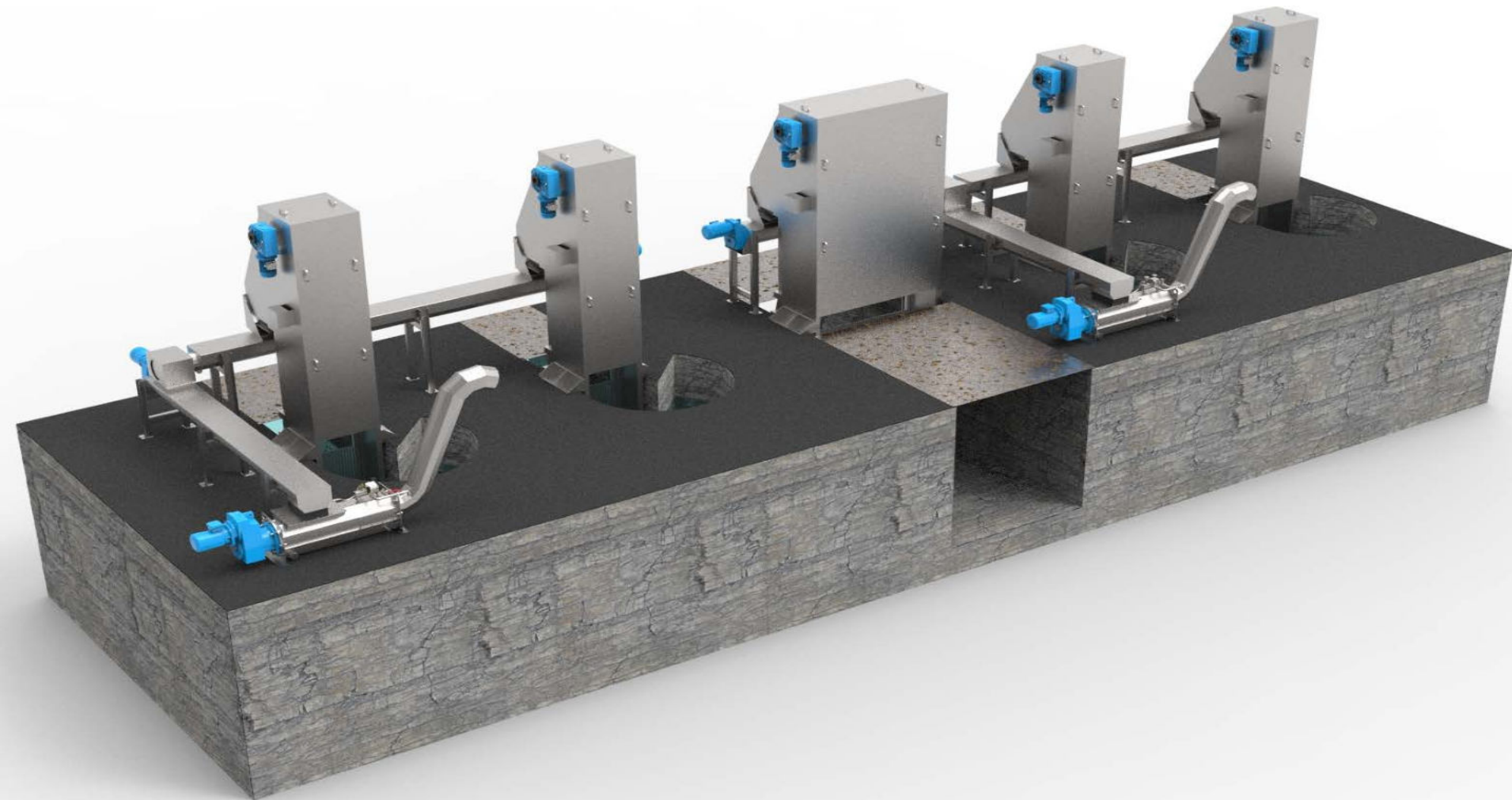
Complex solutions based on RVGO screen



Complex solutions based on RVGO screen



Complex solutions based on RVGO screen



Solution for SPS with channel crushers

Possibility of placing vertical RVGO grating in the channel, which is structurally intended only for channel crushers.



Possibility of placing vertical RVGO screen in the channel, which is structurally intended only for channel crushers



Possibility of manufacturing the RVGO screen with division into parts, to facilitate installation and transportation to the pumping station under cramped conditions or lack of lifting mechanisms.



Objects:

- SPS Moskovskaya 1
- SPS Moskovskaya 2
- SPS Medvedkovo
- SPS Akulovo 1
- SPS Biberevskaya
- SPS Koptevo 2
- SPS Oryol
- SPS Vladimir
- SPS Krasnoyarsk
- SPS Achinsk

An individual solution and equipment composition was applied at each facility.





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