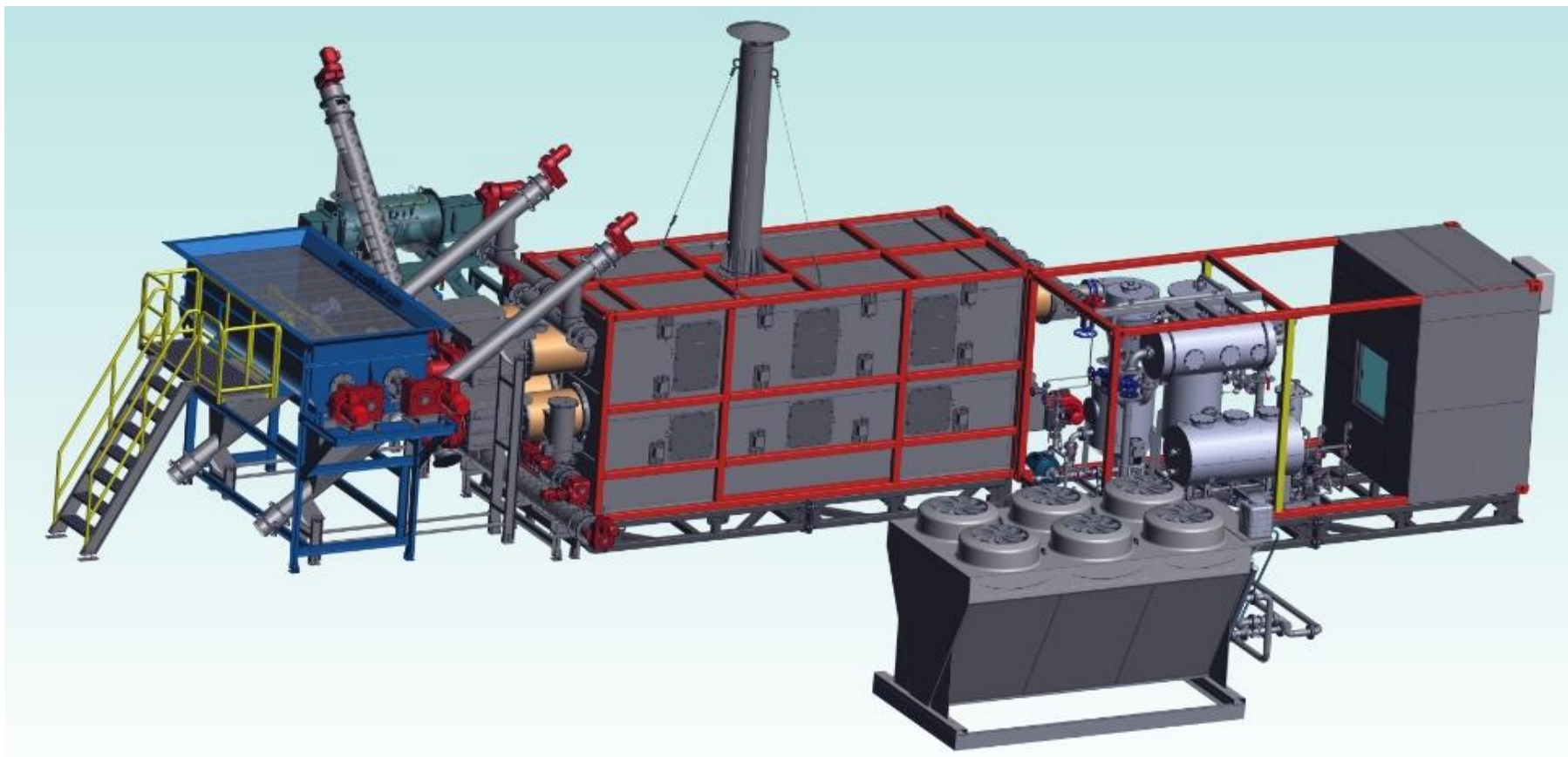


New Type of Thermal Desorption Unit PMI-1.0-TDU /2,0-3,0/ 110kWt /80-120 lph



Developed in 2019. Experience of our engineers with similar equipment - 19 years

The company "PMI Systems" offers a new Russian development - **Thermal Desorption Unit PMI-TDU-III©2019** for the processing of drilling oil sludge, as well as long-term storage sludge, on favorable terms: **significantly cheaper and of higher quality than foreign analogues.**

The leading specialists of our company have long-term international experience in design, production, commissioning, service and round-the-clock technical support of thermal desorption installations of various modifications and productivity. It should be noted that the equipment developed by us includes the unique technical solutions already checked by experience and protected by the patent. Due to the multiple increase of reliability and wear resistance of augers moving in the reactor, in comparison with foreign analogues, the time and total costs for the production of sludge processing works are reduced.

Compact modular design in standard dimensions allows you to transport the installation by road and deploy within 2-3 days. Heating of the reactor and power supply of the diesel generator is carried out at the expense of hydrocarbon components separated during cleaning, which ensures high autonomy. Equipment granulation module allows you to get the output of solid briquettes of different sizes, which allows you to effectively use them in the construction of roads, as well as reduces the overall pollution of the environment, for example, in the marine disposal of the purified solid fraction.

System of drill cuttings thermal treatment provides treatment up to **3 ton/hour** of drill cuttings and further separation into three recovered fractions:

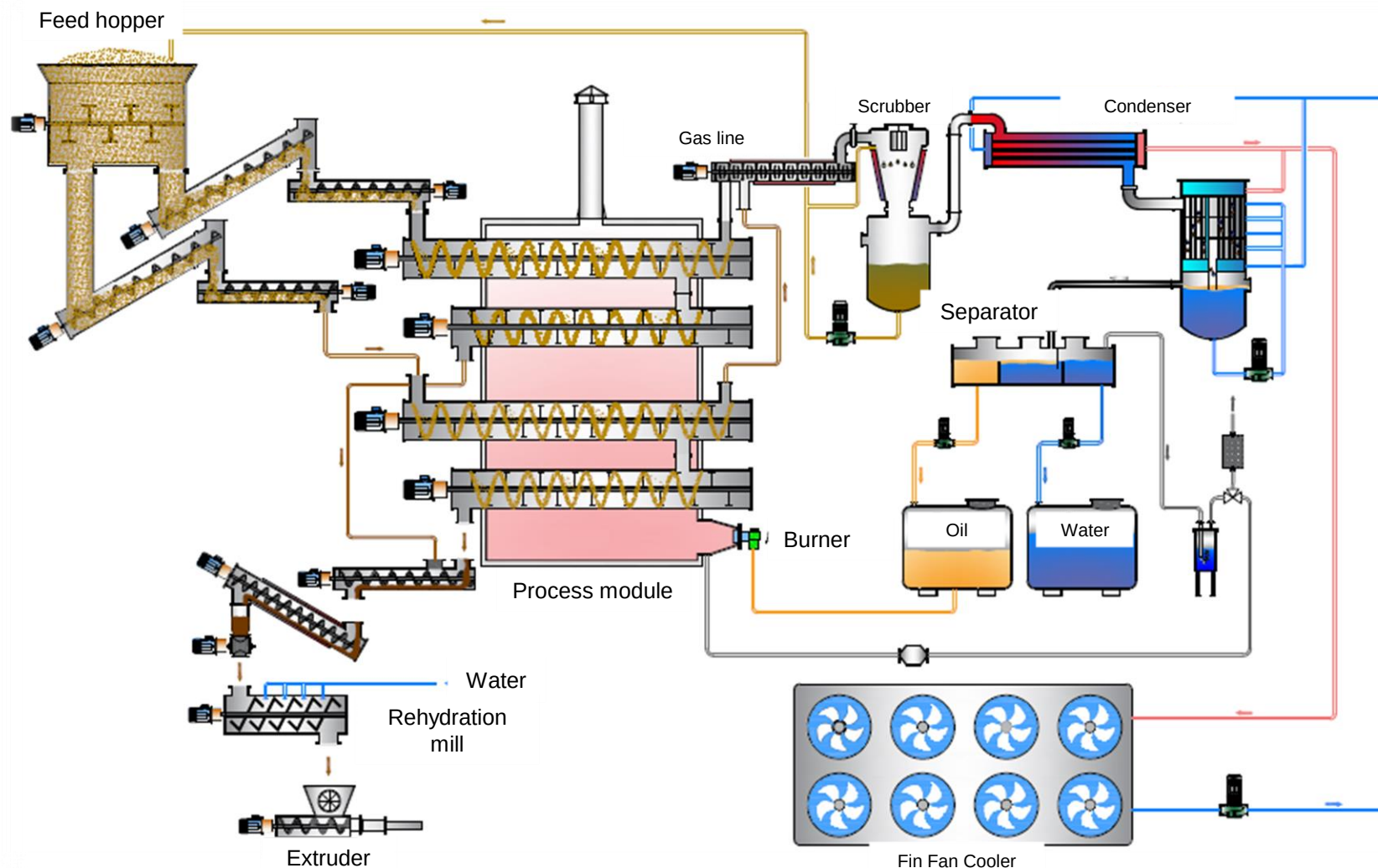
- **Oil** (2 -mineral or synthetic oil, fluid paraffin, diesel fuel)
- **water** (3) and **solid phase** (4)



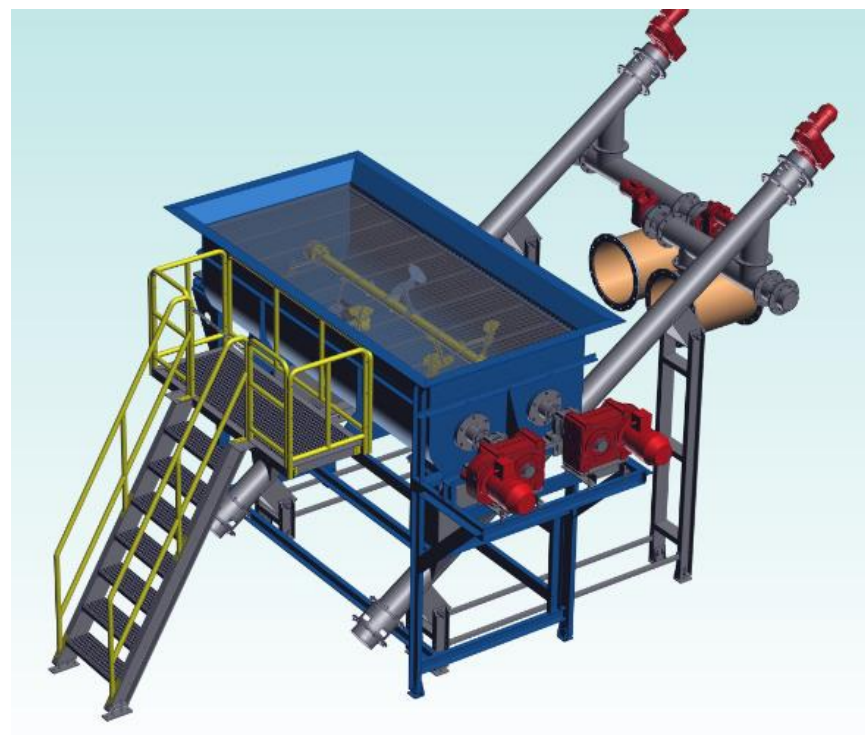
Weight content of raw materials:

- Hydrocarbons content: **5-15%**
- Water content: **5-15%**
- Solid phase content: **70-90%**



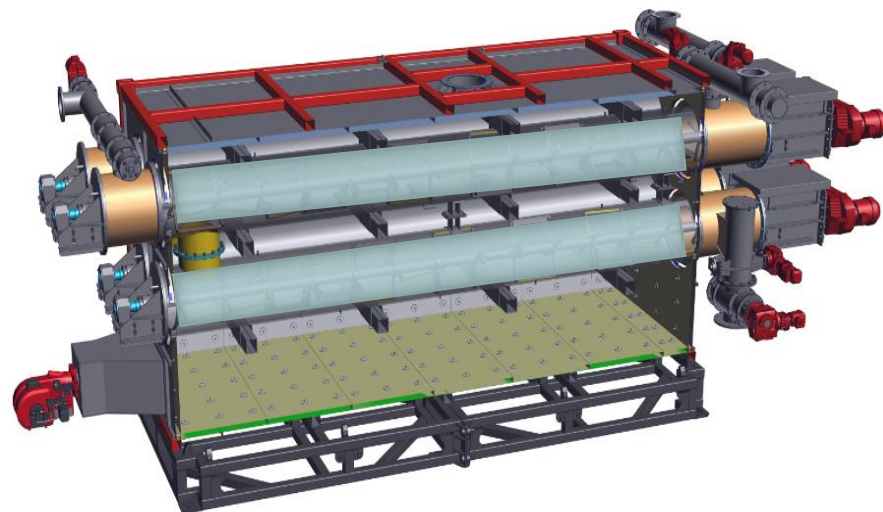


- Hopper with the capacity of 5 m³ is used for dry bulk, liquid and viscous drill cuttings. Material in feed hopper prevents entry of air into desorption chamber allowing to isolate drying process from entry of oxygen and avoid gas ignition
- Feed conveyor is designed based on consistency of treated material which makes it possible to feed bulk material and material with any viscosity.
- Feed rate is controlled by control system which provides required volume of feed material in desorption chamber to maintain desired operating temperature and stable treatment process.



- L= 7'600 мм
- B= 3'600 мм
- H= 4'800 мм
- M= 4'800 кг

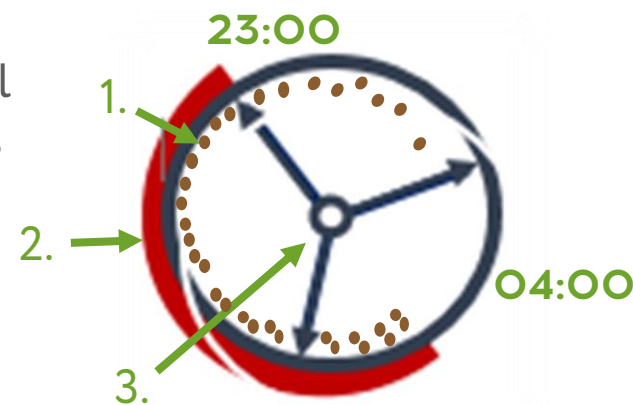
- There are 4 pipes each one more than 6 meters long.
- Compact design of two level process chambers allows to heat material at different temperature rates.
- Maximum efficiency of distribution heat into firebox allows to increase process rate.
- Expected temperatures- of top level 200-300 C and bottom 450-550 C.



- L = 6'058 мм
- B = 2'438 мм
- H = 2'896 мм

Treatment process of drill cuttings can be explained in the following way

1. Here is a chamber where material dries up via heat exchanging with chamber walls.
2. Red color marks show heated zone of the chamber. Drill cuttings are moving clockwise from 4:30 to 22 :00 - it is a work zone of maximum heat exchange. From 23:00 to 4:00 is a work zone of minimum heat exchange.
3. Here is a new type of main screw auger, designed to move material around chamber. Screw auger has been developed in three years time. The advantage is that the screw rotates fluffing drill cuttings inside the chamber at an average speed. This auger screw allows drill cuttings to get dry fast. Regular screw auger does the same job three times less than our new screw auger.

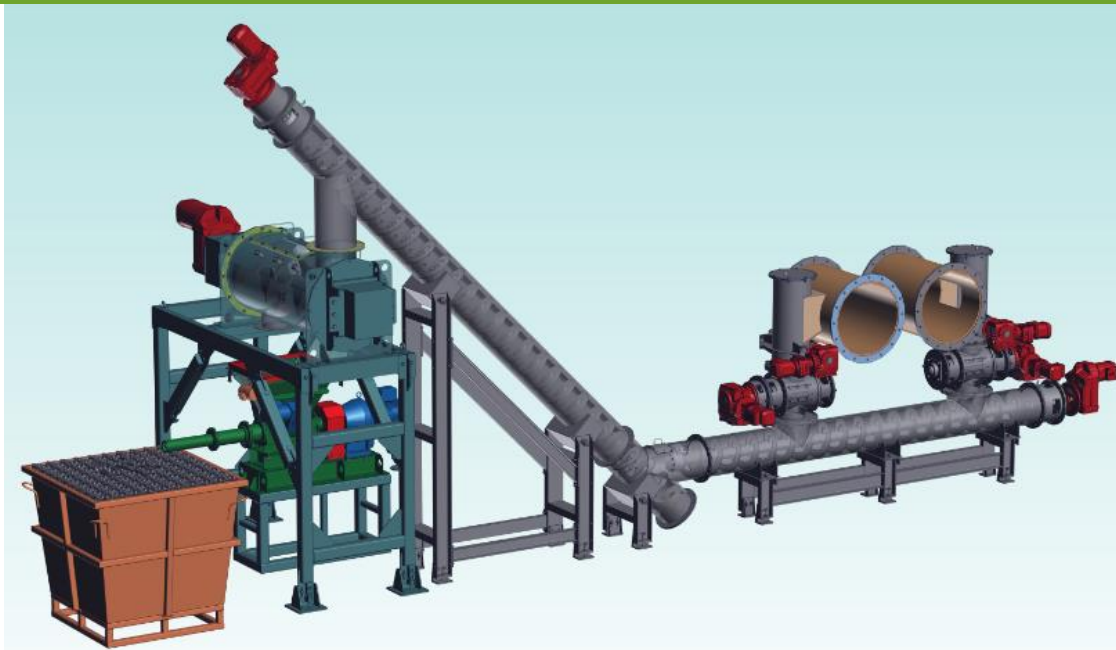


Red zone is heated more than the rest of the chamber to keep stable heat around the chamber.



Picture of a new screw auger was taken from the top of the chamber during the test

- Clogging drill cuttings is the most common cause of regular screw auger.
- Our new design allows screw auger to be always clean during the process.
- Advantage of using new screw auger is stable process of any drill cuttings and less downtime.



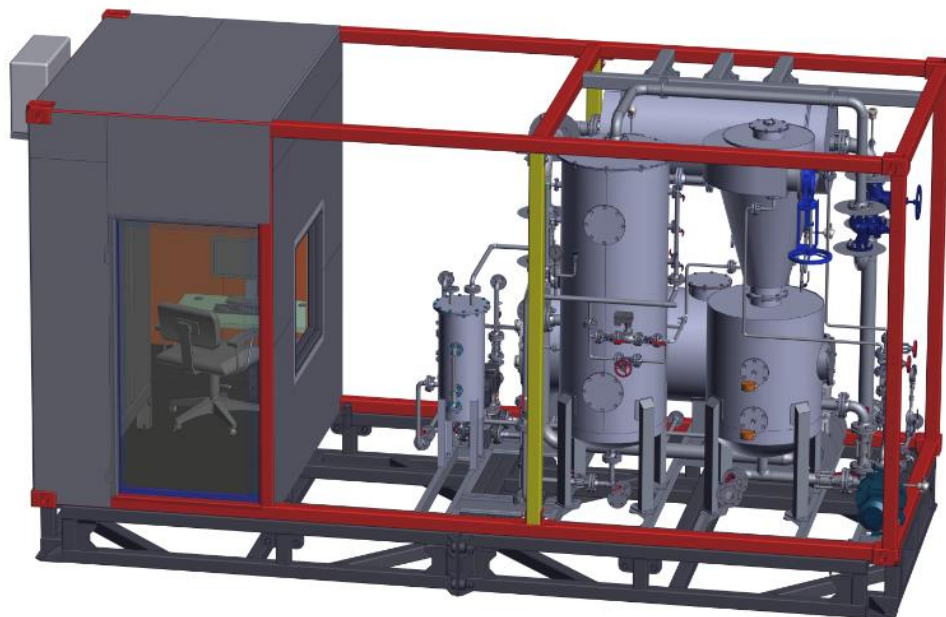
Discharge system is designed to remove dry solids the safe way. There is always level of dry solids into outlet box which serves as a seal to block air entry into the chamber.

Rehydration mill is designed to wet dry solids a little bit to avoid spreading dust around the work zone.

There is also additional extruder can be used. Dry solids can be pelletized and then used by a Client for road filling or site area preparation.

- The gas condensation system module is located in the frame of a 20-foot container
- The operator's room is located on one site
- **Compactness and mobility** - the main advantage of this module

- The control Cabinet is located in the operator room
- Installed video cameras, allowing to monitor online the
- Module is also equipped with an alarm system



- **L= 6'058 мм**
- **B= 2'438 мм**
- **H= 2'896мм**

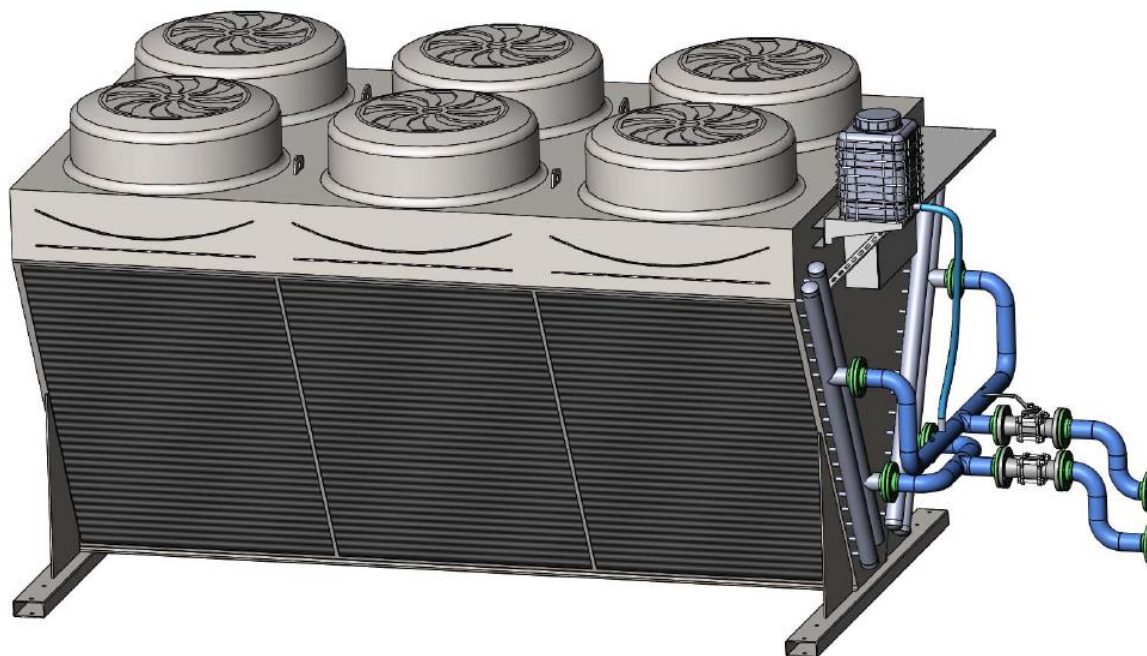
- Gas cleaning screw is designed to clean gas line during process. Cleaning screw allows to reduce volume of dust to 50% before it reaches Scrubber.
- New design of Scrubber allows to clean gas from ultrafine particles.
- New design of condenser is compact, maximum effective and easy to maintain.
- New combine oil condenser
- Gravity oil and water separator
- New design gate valve allows to isolate condenser from chamber during the maintenance.



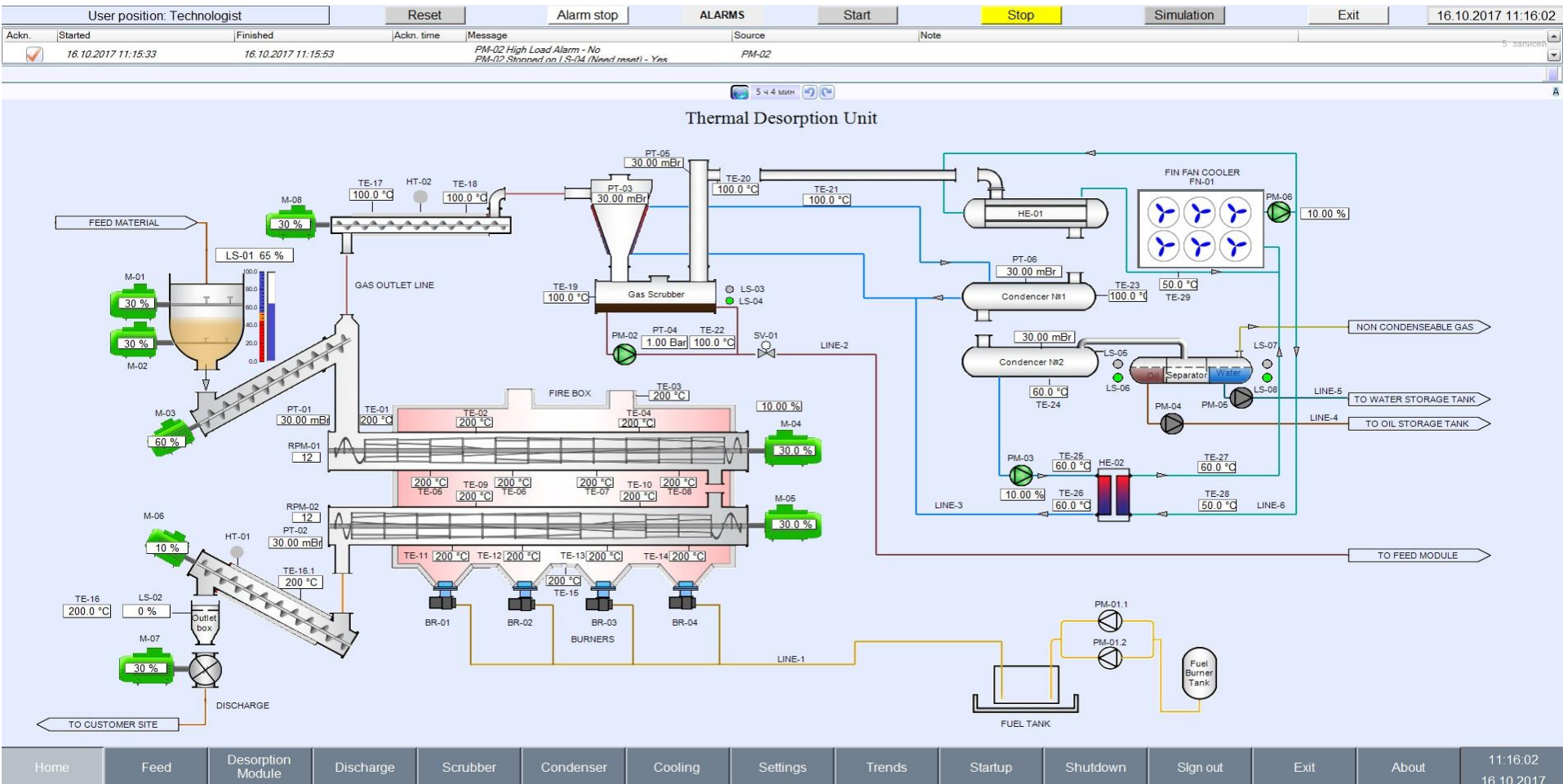
- Control panel is installed in control room and is managed by control system Supervisory Control and Data Acquisition (SCADA).
- TDU-III is operated in automatic mode.
- Also distribution panels of electrical equipment of all systems, modules and PLC control panels are located in control room.
- The unit is equipped with audible and visual alarm so operator can immediately respond to any emergency situation.



- Cooling system plays an important role in technical process providing required temperature conditions for all systems and process modules of the unit.
- The temperature information sensor of the cooling system is displayed on the control panel, which allows the operator to see how the cooling system copes.



Scada program for controlling all of our TDU



Output material after treatment:



- Dry solids containing maximum 0.5%...0.01% of hydrocarbon
- Recovered oil
- Processed water

Treated dry solid residue has essentially no residual hydrocarbons, but does retain salt and heavy metals, and can be disposed of in a landfill or by land-spreading, or may be used in a road construction.



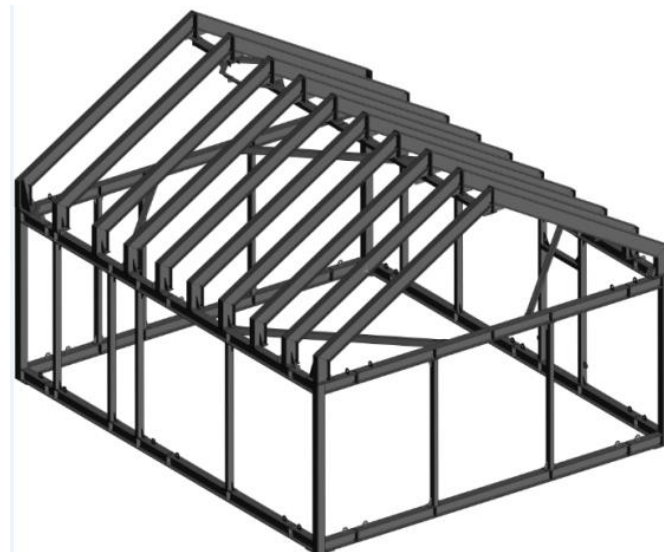
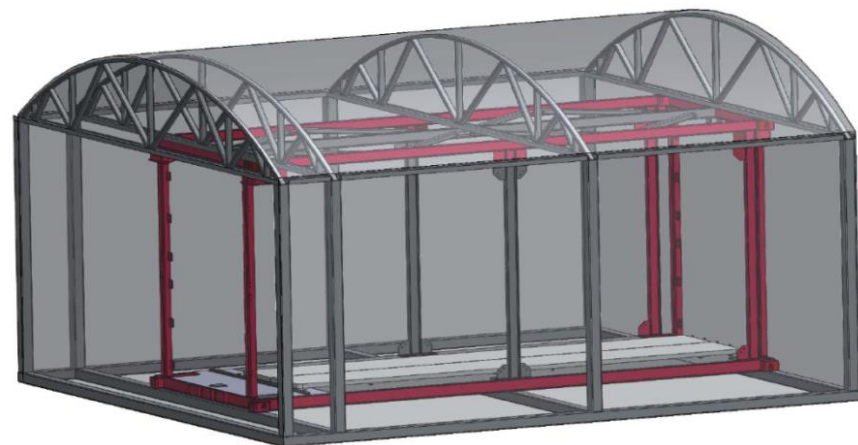
- The size of the site to accommodate the full equipment is an average of 15x20 meters
- Surface requirements: smooth, compacted

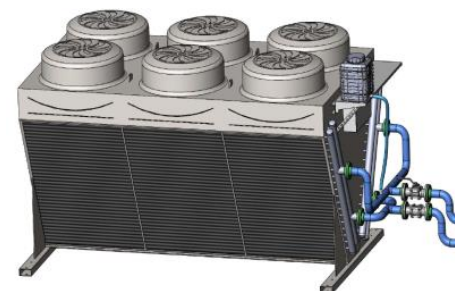
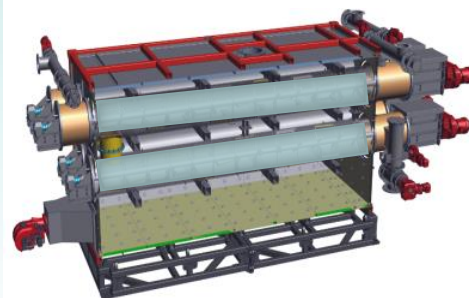
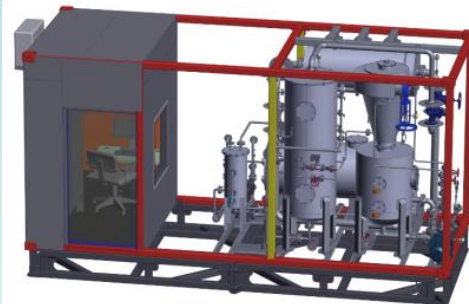
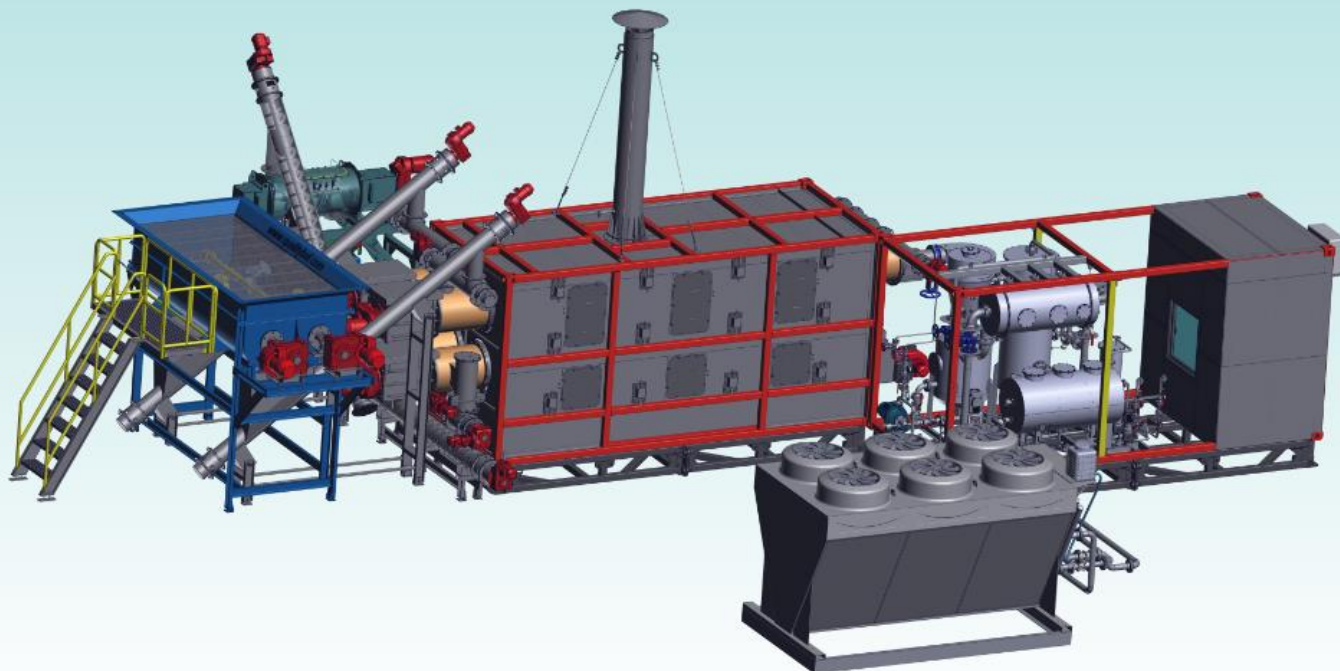
After receipt of full information about the object is developed:

- Outdoor lighting
- Collapsible container for receiving
- Weather shelters (canopies, insulation)

If you can connect to the Internet, the Customer can:

- Observe the processing process on-line
- To monitor the status of equipment and to manage the processes
- Remotely view and record all technical parameter





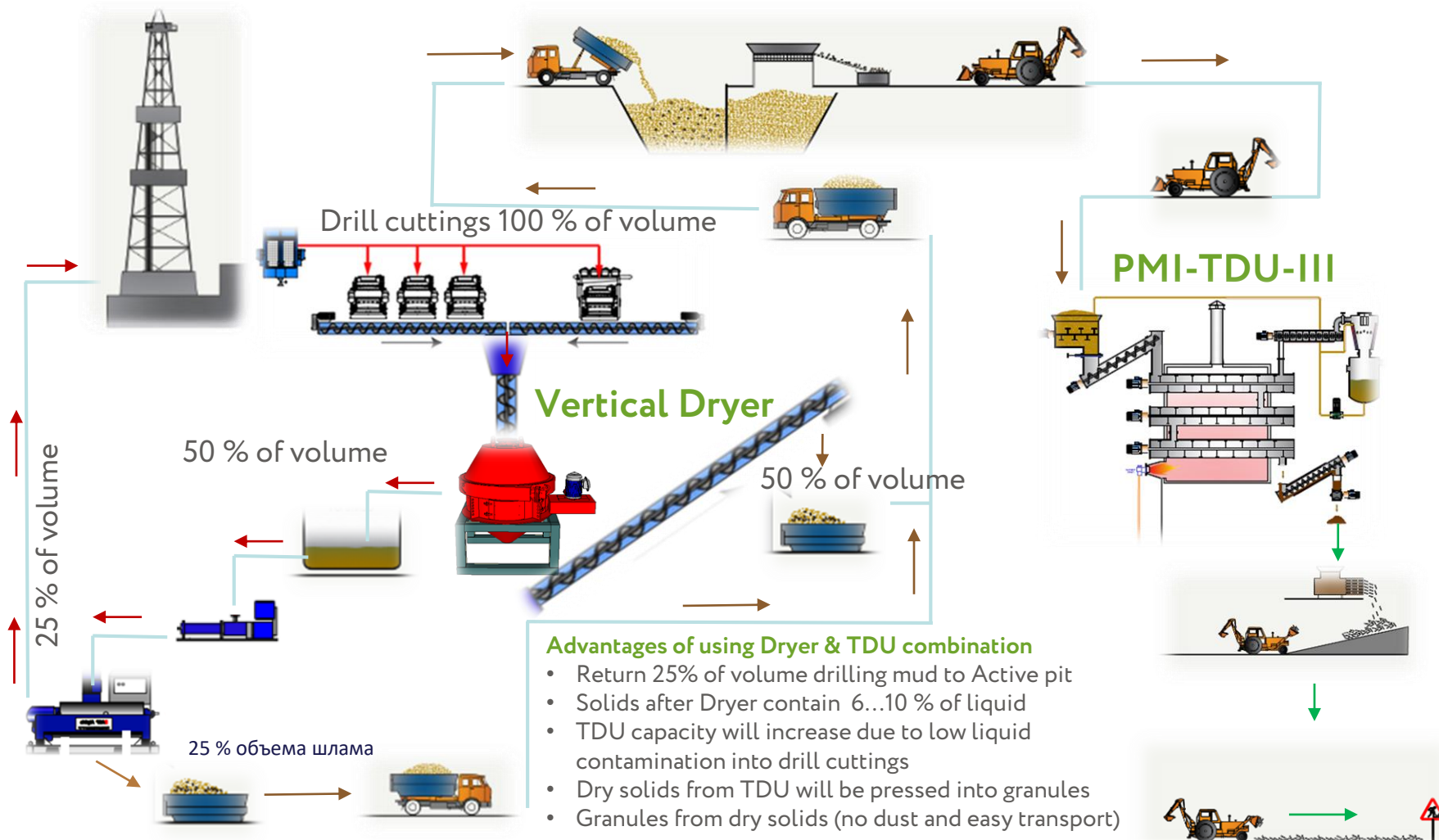
The speed and time of installation depends on the weather conditions and the convenience of the selected prepared site, **is not more than 60 hours**, where the working modules supplied in 20-foot containers are installed in a single structure of the complex.

Operation

TDU-III control program allows you to cover and see the entire process of processing, control all parameters and operation of all units and assemblies. The operator can easily monitor the progress of the process in working condition and will be able to respond to emerging problems in time. Availability and simplicity of the program allows you to easily understand and learn management in a short time. The plant is usually operated by two operators per shift, the number of operators may depend on how much additional equipment will be used in the process of material processing

Electricity

Electricity consumption will be minimal, less than 100 kW/h. This saving is due to the fact that for heating the installation and further maintaining the operating temperature necessary for the process, diesel burners are used, which are also able to work on hydrocarbon-containing products of processing: reduced oil, mineral and synthetic oil, liquid paraffin and diesel



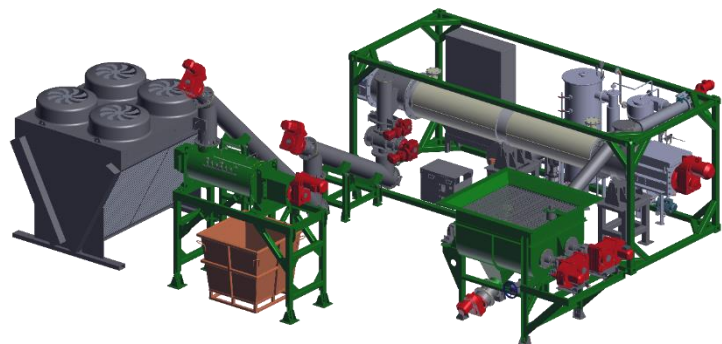
1. Mobile
2. Installation 24-60 hours
3. Minimum power consumption (110 KW)
4. Easy to operate
5. Two operators are required for operation per shift
6. Minimum price compared to foreign analogue
7. Easy to manufacture
8. Able to treat drill cuttings after drying centrifuge and press filter
9. Able to treat viscous drill cuttings from old cuttings pits
10. Heat energy surplus

PMI Systems – the leading Russian company engaged in the development and production of gas and liquid analysis systems for chemical and petrochemical enterprises, drilling fluids processing plants, sludge storage and ash waste, as well as technologies for enrichment, refining and briquetting of solid fuel resources.

Exclusive rights to the patents of the company of «Quality group Belgorod» allowed to advance considerably in the field of processing of drilling slurries due to optimization of organizational processes: development of design documentation, a complete set, production and testing of the equipment.

We will be glad to cooperate in the promotion of the latest Russian developments both in the domestic and international market.





PMI-1.0-Induction TDU-Mini /0,3-0,6/ 200kWt/ 0 lph

The latest induction thermal desorption unit. All components of the installation are tested by long-term operation experience and have higher technical and economic characteristics than foreign analogues.

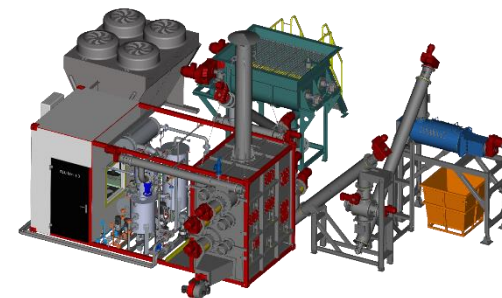
PMI-1.0-Induction TDU /3,0-4,0/ 800kWt/ 0 lph

Powerful high-performance installation is designed to work with large volumes of waste, for example, in large landfills. Installation can be installed on coasters working with offshore drilling platforms. платформами.



PMI-1.0-TDU-Mini /0,5-1,0/ 70kWt/ 20-40 lph

The compact mobile version provides flexibility when working in the mode of frequent change of the sludge processing site, for example, during exploratory drilling.



THE OFFERED VARIANTS OF COOPERATION:

Rent of the rig for the period of drilling
operation or elimination
of accidental spills

Test operation to assess the results and
performance in the processing of sludge
storage facilities for long-term storage

Production of TDU by specified
parameters

Production of INDUCTION TDU
of high performance



**Thank you for your
attention!**